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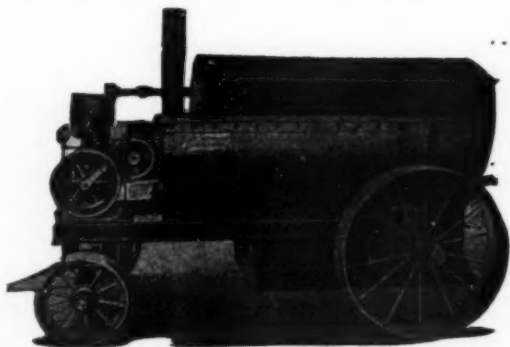


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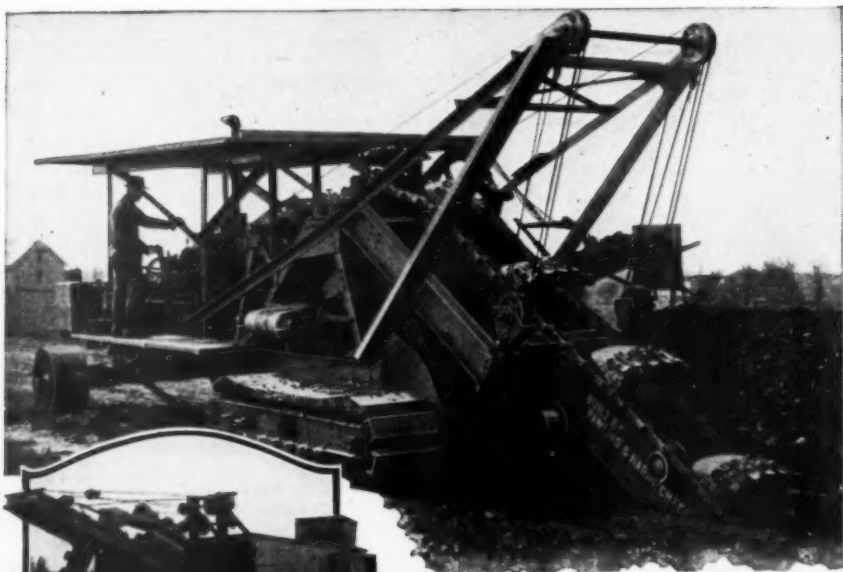
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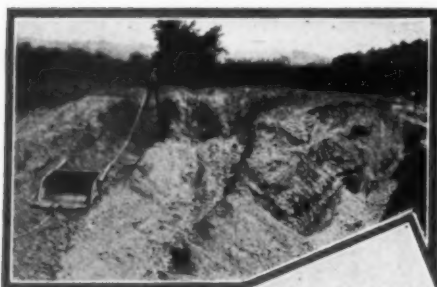
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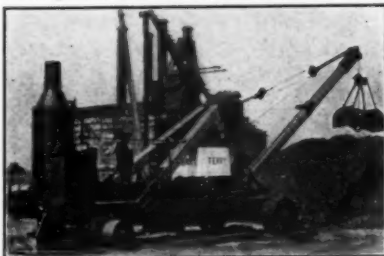
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American Hoist & Derrick Co., St. Paul, Minn.  
Byers Machine Co., Ravenna, O.  
Carpenter & Co., Geo. B., Chicago, Ill.  
Clyde Iron Works Sales Co., Duluth, Minn.  
Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.  
Federal Bridge & Struc. Co., Waukesha, Wis.  
Flory Mfg. Co., S., Bangor, Pa.  
Insley Mfg. Co., Indianapolis, Ind.  
Lakeside Bridge & Steel Co., N. Milwaukee, Wis.  
Lidgerwood Manufacturing Co., New York.  
Lincoln Iron Works, Rutland, Vt.  
National Hoisting Engine Co., Harrison, N. J.  
Saggen Derrick Co., Chicago, Ill.  
Smith, Whitcomb & Cook Co., Barrie, Vt.  
Superior Iron Works, Superior, Wis.

### DERRICKS, PIPE LAYING

\*Terry Mfg. Co., New York.  
Austin Machinery Corp'n, Chicago, Ill.

Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.

Lidgerwood Manufacturing Co., New York.

Mueller Mfg. Co., H., Decatur, Ill.

### DERRICKS, REVOLVING

\*Terry Mfg. Co., New York.

Clyde Iron Works Sales Co., Duluth, Minn.

Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.

Lidgerwood Manufacturing Co., New York.

### DERRICKS, STEEL

\*Pawling & Harnischfeger Co., Milwaukee, Wis.

\*Terry Mfg. Co., New York.

American Hoist & Derrick Co., St. Paul, Minn.

Austin Machinery Corp'n, Chicago, Ill.

Clyde Iron Works Sales Co., Duluth, Minn.

Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.

Federal Bridge & Struc. Co., Waukesha, Wis.

Hayward Co., New York.

Insley Mfg. Co., Indianapolis, Ind.

Lakeside Bridge & Steel Co., N. Milwaukee, Wis.

Lidgerwood Manufacturing Co., New York.

Taylor Portable Steel Derrick Co., Chicago, Ill.

### DERRICKS, STEEL PORTABLE

\*Terry Mfg. Co., New York.

Austin Machinery Corp'n, Chicago, Ill.

Blaw-Knox Co., Pittsburgh, Pa.

Clyde Iron Works Sales Co., Duluth, Minn.

Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.

Lidgerwood Manufacturing Co., New York.

Taylor Portable Steel Derrick Co., Chicago, Ill.

### DERRICKS, TRAVELING

\*Bay City Dredge Works, Bay City, Mich.

\*Terry Mfg. Co., New York.

American Hoist & Derrick Co., St. Paul, Minn.

Austin Machinery Corp'n, Chicago, Ill.

Byers Machine Co., Ravenna, Ohio.

Clyde Iron Works Sales Co., Duluth, Minn.

Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.

Hayward Co., New York.

Nat'l Hoisting Engine Co., Harrison, N. J.

Orton & Steinbrenner Co., Chicago, Ill.

### DISINFECTING CHEMICALS

Barrett Co., New York.

Electro Bleaching Gas Co., New York.

Mathieson Alkali Works, Inc., New York.

### DISTRIBUTING PLANTS, CONCRETE

\*Koehring Co., Milwaukee, Wis.

Archer Iron Works, Chicago, Ill.

Insley Mfg. Co., Indianapolis, Ind.

Lakewood Engineering Co., Cleveland, O.

Ransome Concrete Machy. Co., Dunellen, N. J.

### DITCHING MACHINES (See Excavators, Ditch and Trench)

### DOORS, METAL

Central Metal Products Corp., Canton, Ohio.

Dahlstrom Metallic Door Co., Jamestown, N. Y.

Friedrich Co., E. H., Holyoke, Mass.

Lawton-Stephens Co., Brooklyn, N. Y.

McFarland Co., J. C., La Porte, Ind.

Penn Metal Co., Boston, Mass.

Riester & Thesmacher Co., Cleveland, Ohio.

Sykes Co., Chicago, Ill.

Thorp Fire Proof Door Co., Minneapolis, Minn.

### DOORS AND SHUTTERS, STEEL ROLLING

Cornell Iron Works, New York.

Kinnear Mfg. Co., Columbus, O.

Variety Mfg. Co., Chicago, Ill.

Wilson Corp., J. G., New York.

### DRAFTING MACHINES

Universal Drafting Machine Co., Cleveland, O.

### DREDGES

\*Bay City Dredge Works, Bay City, Mich.

American Steel Dredge Co., Fort Wayne, Ind.

Eucyrus Co., South Milwaukee, Wis.

Ellicott Machine Corp'n., Baltimore, Md.

Erie Steam Shovel Co., Erie, Pa.

Hayward Co., New York.

Lidgerwood Mfg. Co., New York.

Marion Steam Shovel Co., Marion, O.

Osgood Co., The, Marion, O.

Stockton Iron Works, Stockton, Cal.

Superior Iron Works, Superior, Wis.

Valcan Iron Works, Jersey City, N. J.

### DREDGES, DIPPER

\*Bay City Dredge Works, Bay City, Mich.

American Steel Dredge Co., Fort Wayne, Ind.

Austin Machinery Corp'n, Chicago, Ill.

Eucyrus Co., South Milwaukee, Wis.

Fairbanks Steam Shovel Co., Marion, O.

Marion Steam Shovel Co., Marion, O.

Osgood Co., Marion, O.

\* Indicates that the manufacturer carries an advertisement. See index facing inside back cover.



## Pick Your Toughest Job— Watch Cletrac Speed It Up

### These Are All Cletrac Jobs

Pulling Ditching Machines  
Pulling Rooter and Grading  
Plows  
Handling Fresno or Wheel  
Scrapers  
Hauling away Dirt  
Bringing in Material  
Operating Stone Crusher,  
Gravel Screening Mill,  
Concrete Mixers, Con-  
veyors and Elevators  
Pulling Graders and Levelers  
Pulling Heavy Rollers  
Pulling or Pushing Snow  
Plows  
Cleaning Roadside Drains  
Working in and out of Ex-  
cavations  
Mowing Roadsides  
Hauling Dump Cars on  
Industrial Railroad  
Building Golf Courses and  
Parks  
Mowing and General Main-  
tenance of Golf Courses  
and Parks

IT may be excavating, trenching or scraping. It may be pulling the concrete mixer, working the pumps, hauling material from the cars, or spotting empties. It may be any one of your "hundred and one" jobs that demand unusual speed, power and endurance—Model "W" Industrial Cletrac will swing it with an ease that will surprise you, working from early morning until you say "Quit", and coming back the next day for more.

That's the beauty of this Model "W" Industrial Cletrac—it's ready for any job, any weather, any time. And you can depend upon its crawler tracks working surely and steadily over footing on which horses and other power units would be helpless.

One contractor says, "Model 'W' Industrial Cletrac will go anywhere, right against the walls, plowing perpendicular. It will walk out of the cellar with an ordinary load behind it, when banks are so steep that horses can barely struggle out without a load. We saved one half of its price in excavating one cellar."

We have facts and figures showing Cletrac's money saving ability on all kinds of jobs. Let us tell you how Cletrac will speed up your profits. Write us today.

### THE CLEVELAND TRACTOR COMPANY

*Largest Producers of Crawler Tractors in the World*  
19211 Euclid Avenue Cleveland, Ohio



## DREDGES, HYDRAULIC

Bucyrus Co., South Milwaukee, Wis.  
Ellicott Mach. Corp., Baltimore, Md.  
Fairbanks Steam Shovel Co., Marion, O.  
Marion Steam Shovel Co., Marion, O.  
Morris Machine Works, Baldwinville, N. Y.

## DREDGING PUMPS AND ACCESSORIES

Erie Pump & Engine Wks., Medina, N. Y.

## DRILLS, AIR

Dalzell Co., Thos. H., Philadelphia, Pa.  
Denver Rock Drill Mfg. Co., Denver, Colo.  
McKiernan-Terry Drill Co., New York.  
Chicago Pneumatic Tool Co., New York.  
Cleveland Pneumatic Tool Co., Cleveland, O.  
Cleveland Rock Drill Co., Cleveland, Ohio.  
Helwig Mfg. Co., St. Paul, Minn.  
Independent Pneumatic Tool Co., Chicago, Ill.  
Ingersoll-Rand Co., New York.  
Sullivan Machinery Co., Chicago, Ill.

## DRILLS, CORE

McKiernan-Terry Drill Co., New York.  
Dobbins Core Drill Co., Inc., New York.  
Ingersoll-Rand Co., New York.  
Standard Diamond Drill Co., Chicago, Ill.  
Sullivan Mach'y Co., Chicago, Ill.

## DRILLS, HAMMER

Denver Rock Drill Mfg. Co., Denver, Colo.  
McKiernan-Terry Drill Co., New York.  
Chicago Pneumatic Tool Co., New York.  
Cleveland Pneumatic Tool Co., Cleveland, O.  
Ingersoll-Rand Co., New York.  
Sullivan Machinery Co., Chicago, Ill.

## DRILLS, ROCK

Dalzell Co., Thos. H., Philadelphia, Pa.  
Denver Rock Drill Mfg. Co., Denver, Colo.  
McKiernan-Terry Drill Co., New York.  
Chicago Pneumatic Tool Co., New York.  
Cleveland Rock Drill Co., Cleveland, Ohio.  
Helwig Mfg. Co., St. Paul, Minn.  
Ingersoll-Rand Co., New York.  
Sullivan Machinery Co., Chicago, Ill.  
Wood Drill Works, Paterson, N. J.

## DRILLS FOR WELLS AND BLAST HOLES

(See Well Drilling Machinery)

## DRUMS, HOLDING

Blaw-Knox Co., Pittsburgh, Pa.  
Clyde Iron Works, Duluth, Minn.  
Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.  
Hayward Co., New York.  
Monaghan Machine Co., Chicago, Ill.

## DRYERS, ASPHALT AND CEMENT

Allis-Chalmers Co., Milwaukee, Wis.  
American Blower Co., Detroit, Mich.  
American Process Co., New York.  
Atlas Dryer Co., Cleveland, O.  
Bartlett & Snow Co., C. O., Cleveland, O.  
Cummer & Son Co., P. D., Cleveland, O.  
East Iron & Machine Co., Lima, O.  
Ruggles-Coles Eng. Co., New York.  
Variety Iron & Steel Works, Cleveland, O.

## DUMP BODIES FOR MOTOR TRUCKS

Hell Company, Milwaukee, Wis.  
Littleford Bros., Cincinnati, O.  
American Truck Body Co., Inc., Martinville, Va.  
Archer Iron Works, Chicago, Ill.  
Auto Truck Steel Body Co., Chicago, Ill.  
Columbia Wagon & Body Co., Columbia, Pa.  
Columbian Steel Tank Co., Kansas City, Mo.  
Horizontal Hydraulic Hoist Co., Detroit, Mich.  
International Motor Co., New York.  
Jennings Automatic Dump Body, Roanoke, Va.  
Lee Trailer & Body Co., Chicago, Ill.  
Pechstein Iron Works, Keokuk, Iowa.  
Simplex Mfg. Co., Cincinnati, Pa.  
Van Dorn Iron Wks., Cleveland, Ohio.  
Wood Hydraulic Hoist & Body Co., Detroit, Mich.

## DUMP CARTS AND WAGONS, HORSE DRAWN

Acme Road Machinery Co., Frankfort, N. Y.  
Austin Western Road Mch'y Co., Chicago, Ill.  
Russell Grader Mfg. Co., Minneapolis, Minn.  
Acme Wagon Co., Emigsville, Pa.  
Austin Mfg. Co., Chicago, Ill.  
Columbia Wagon & Body Co., Columbia, Pa.  
Eagle Wagon Works, Auburn, N. Y.  
Holsbog & Bro., Geo. H., Jeffersonville, Ind.  
Stroud & Co., Omaha, Neb.  
Tiffin Wagon Co., Tiffin, Ohio.  
Watson Products Corp., Canastota, N. Y.  
Western Wheeled Scraper Co., Aurora, Ill.

## DUST LAYING AND ROAD BINDER MATERIALS

Standard Oil Co. (Indiana), Chicago, Ill.

## \*Texas Co., New York.

Barrett Co., New York.  
Carbondale Calcium Co., Carbondale, Pa.  
Dow Chemical Co., Midland, Mich.  
Dustoline for Roads Co., Summit, N. J.  
Semet-Solvay Co., Solvay, N. Y.

## DYNAMITE (See Explosives)

## EJECTORS, SEWAGE

Pacific Flush Tank Co., Chicago, Ill.  
Yeomans Bros. Co., Chicago, Ill.

## ELECTRIC GENERATORS AND MOTORS

Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
Crocker-Wheeler Co., Ampere, N. J.  
Fairbanks, Morse & Co., Chicago, Ill.  
General Electric Co., Schenectady, N. Y.  
Ideal Elec. & Mfg. Co., Mansfield, O.  
Lincoln Electric Co., Cleveland, O.  
Robbins & Myers Co., Springfield, O.  
Triumph Electric Co., Cincinnati, O.  
Wagner Elec. Mfg. Co., St. Louis, Mo.  
Western Electric Co., New York.  
Westinghouse Elec. & Mfg. Co., E. Pittsb'gh, Pa.

## ELECTRIC LAMPS

General Electric Co., Schenectady, N. Y.  
Westinghouse Lamp Co., New York.

## ELECTRIC LIGHTING PLANTS

Climax Engineering Co., Clinton, Ia.  
Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
Fairbanks, Morse & Co., Chicago, Ill.  
General Electric Co., Schenectady, N. Y.  
Westinghouse Elec. & Mfg. Co., E. Pittsb'gh, Pa.  
Western Electric Co., New York.

## ELECTRIC SUPPLIES, METERS, ETC.

Bisell Co., F., Toledo, Ohio.  
General Electric Co., Schenectady, N. Y.  
Westinghouse Elec. & Mfg. Co., E. Pittsb'gh, Pa.

## ELECTRIC TRANSFORMERS

Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
General Electric Co., Schenectady, N. Y.  
Kuhlman Electric Co., Bay City, Mich.  
Westinghouse Elec. & Mfg. Co., E. Pittsb'gh, Pa.

## ELECTRIC WIRES AND CABLES. (See "Wire and Cable")

## ELEVATORS, BUCKET

Austin Western Road Mach'y Co., Chicago, Ill.  
Good Roads Mach'y Co., Kennett Square, Pa.  
Hais Mfg. Co., Geo., New York.  
Littleford Bros., Cincinnati, Ohio.  
Russell Grader Mfg. Co., Minneapolis, Minn.  
Weller Mfg. Co., Chicago, Ill.  
Atlas Eng. Co., Milwaukee, Wis.  
Bartlett & Snow Co., C. O., Cleveland, Ohio.  
Chain Belt Co., Milwaukee, Wis.  
Fairfield Engineering Co., Lancaster, Ohio.  
Gifford-Wood Co., Hudson, N. Y.  
Jeffrey Mfg. Co., Columbus, O.  
Link-Belt Co., Chicago, Ill.  
Olson & Co., Sam'l., Chicago, Ill.  
Robins Conv. Belt Co., N. Y. O.  
Webster Mfg. Co., Chicago, Ill.  
Worthington Pump & Mch'y Corp., New York.

## ELEVATORS, PASSENGER, FREIGHT, ETC.

Albro-Clem Elevator Co., Philadelphia, Pa.  
Amer. Elevator & Mach. Co., Louisville, Ky.  
Bay State Elevator Co., Springfield, Mass.  
Houghton Elev. & Mach. Co., Toledo, Ohio.  
Kaestner & Hecht Co., Chicago, Ill.  
Llewellyn Iron Works, Los Angeles, Cal.  
Montgomery Elevator Co., Moline, Ill.  
Otis Elevator Co., New York.  
Ridgeway & Son Co., C., Coatesville, Pa.  
See Elec. Elevator Co., A. B., New York.  
Spindel, J. G., Reading, Pa.  
Warner Elevator Mfg. Co., Cincinnati, O.  
Warraw Elevator Co., Warsaw, N. Y.

## ENGINES, GAS AND GASOLINE

Climax Engineering Co., Clinton, Ia.  
Holt Mfg. Co., Peoria, Ill.  
Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
C. H. & E. Mfg. Co., Milwaukee, Wis.  
Chicago Pneumatic Tool Co., New York.  
Domestic Engine & Pump Co., Shippensburg, Pa.  
Evinrude Motor Co., Milwaukee, Wis.  
Fairbanks, Morse & Co., Chicago, Ill.  
Foss Gas Engine Co., Springfield, Ohio.  
Fuller & Johnson Mfg. Co., Madison, Wis.  
Gade Bros. Mfg. Co., Iowa Falls, Iowa.  
Nelson Bros. Co., Saginaw, Mich.  
"New-Way" Motor Co., Lansing, Mich.  
Novo Engine Co., Lansing, Mich.

\* Indicates that the manufacturer carries an advertisement. See index facing inside back cover.



**Don't blame the "mix"  
or the roadbed - or  
extreme tempera-  
ture changes - use**

**Carey  
Elastite**  
TRADE MARK U.S. PAT. OFFICE  
PROVED AND  
ACCEPTED  
EXPANSION  
JOINT

An annual temperature fluctuation of 100 degrees will cause 100 yards of concrete to expand or contract nearly two inches, enough to cause the destruction of this road if expansion allowance were not made.

Elastite joints do not melt in summer, nor get brittle in winter. Elastite does not squeeze out above the joint in extreme heat and elastically expands and adheres to the concrete as the slabs separate, keeping a tight joint at all times.

*Made like a sandwich  
Installed like a board*



**S**TOP road-trouble before it starts. Stresses of expansion due to temperature changes are easily absorbed by installing Elastite joints every thirty feet in the pavement, preventing road-injury from cracking and heaving under the most extreme temperature fluctuations.

There is no other expansion joint that equals Elastite. Elastite "sandwich-construction" is patented and the Carey process of tempering asphalt cannot be duplicated. Ordinary asphalt slabs do not possess the elasticity, compressibility and resiliency of Elastite and therefore cannot produce a permanently water-tight and frost-tight joint as Elastite does.

Elastite performance is an easily verified record covering years of engineering experience and Elastite deliveries are dependable and prompt, shipments to any part of the country being made within forty-eight hours from ample stocks carried in sixteen convenient distributing centers. Write for particulars and sample.

### THE PHILIP CAREY COMPANY

9 Wayne Ave., Lockland, Cincinnati, O.

*Elastite is made in lengths, widths, and thicknesses as required, can be cut to crown or in any special shape and comes to the job ready to use.*

5-22



Universal Motor Co., Oskosh, Wis.  
Weber Engine Co., Kansas City, Mo.  
Worthington Pump & Mch'y. Corp., New York.

**ENGINES, HIGH DUTY WATER-WORKS**  
Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
De Laval Steam Turbine Co., Trenton, N. J.  
Fairbanks, Morse & Co., Chicago, Ill.  
Morris Machine Works, Baldwinville, N. Y.  
Murray Iron Works Co., Burlington, Ia.  
Worthington Pump & Mch'y. Corp., New York.

## ENGINES, OIL

**DIESEL**  
Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
Busch-Sulzer Bros.-Diesel Eng. Co., St. Louis, Mo.  
Dodge Sales & Eng. Co., Mishawaka, Ind.  
Fulton Iron Works Co., St. Louis, Mo.  
Haddfield-Penfield Steel Co., Bucyrus, Ohio.  
McIntosh & Seymour Corp., Auburn, N. Y.  
Nordberg Mfg. Co., Milwaukee, Wis.

**SEMI-DIESEL**  
Advance Rumely Thresher Co., La Porte, Ind.  
Anderson Pdry. & Mach. Co., Anderson, Ind.  
Bessemer Gas Eng. Co., Grove City, Pa.  
Buckeye Machinery Co., Lima, O.  
Chicago Pneumatic Tool Co., Chicago, Ill.  
De La Vergne Machine Co., New York.  
Evinrude Motor Co., Milwaukee, Wis.  
Fairbanks, Morse & Co., Chicago, Ill.  
Foss Gas Engine Co., Springfield, O.  
Ingersoll-Rand Co., New York.  
Midwest Engine Co., Indianapolis, Ind.  
Miets Corp'n. Aug., New York.  
Muncie Oil Eng. Co., Muncie, Ind.  
Nordberg Mfg. Co., Milwaukee, Wis.  
St. Mary's Oil Eng. Co., St. Charles, Mo.  
Stover Steel Tank & Mfg. Co., Freeport, Ill.  
Taylor Machine Co., Cleveland, O.  
Weber Engine Co., Kansas City, Mo.  
Worthington Pump & Mch'y. Corp., New York.

## ENGINES, PUMPING

\*Climax Engineering Co., Clinton, Ia.  
Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
American Gas Engine Co., Kansas City, Mo.  
American Well Works, Aurora, Ill.  
Dayton-Dowd Co., Quincy, Ill.  
Deming Co., Salem, O.  
Fairbanks, Morse & Co., Chicago, Ill.  
Enterprise Mch'y. Co., Minneapolis, Minn.  
Midwest Engine Co., Indianapolis, Ind.  
Nordberg Mfg. Co., Milwaukee, Wis.  
United Iron Works, Inc., Kansas City, Mo.  
Weinman Pump Mfg. Co., Columbus, O.  
Westinghouse Elec. & Mfg. Co., E. Pittsb'gh, Pa.  
Worthington Pump & Mch'y. Corp., New York.

## ENGINES, STEAM

Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
Dake Engine Co., Grand Haven, Mich.  
Erie-Ball Engine Co., Pittsburgh, Pa.  
Erie Pump & Engine Co., Medina, N. Y.  
Filer-Stowell Co., Milwaukee, Wis.  
Hardie-Tynes Mfg. Co., Birmingham, Ala.  
Leffel Co., J., Springfield, O.  
Morris Machine Works, Baldwinville, N. Y.  
Murray Iron Works Co., Burlington, Ia.  
Nordberg Mfg. Co., Milwaukee, Wis.  
Sturtevant Co., B. F., Hyde Park, Boston, Mass.  
Vilter Mfg. Co., Milwaukee, Wis.

## ENGINES, TRACTION

\*Austin Western Road Mch'y. Co., Chicago, Ill.  
\*Holt Mfg. Co., Peoria, Ill.  
Fairbanks, Morse & Co., Chicago, Ill.  
Oliver Tractor Co., Knoxville, Tenn.  
Phoenix Mfg. Co., Eau Claire, Wis.

## EXCAVATING MACHINERY. (See Names Under Excavators, also Steam Shovels)

### EXCAVATORS, CABLEWAY

\*Smith Co., T. L., Milwaukee, Wis.  
Bucyrus Co., South Milwaukee, Wis.  
Byers Machine Co., Ravenna, Ohio.  
Lidgerwood Mfg. Co., New York.

### EXCAVATORS, DITCH AND TRENCH

\*Bay City Dredge Works, Bay City, Mich.  
\*Keystone Driller Co., Beaver Falls, Pa.  
\*Pawling & Harnischfeger Co., Milwaukee, Wis.  
\*Russell Grader Mfg. Co., Minneapolis, Minn.  
American Hoist & Derrick Co., St. Paul, Minn.  
Austin Machinery Corp'n., Chicago, Ill.  
Byers Machine Co., Ravenna, Ohio.  
Ball Engine Co., Erie, Pa.

Buckeye Traction Ditcher Co., Findlay, O.  
Bucyrus Co., South Milwaukee, Wis.  
Clyde Iron Works Sales Co., Duluth, Minn.  
Economy Excavator Co., Iowa Falls, Ia.  
Erie Steam Shovel Co., Erie, Pa.  
Fairbanks Steam Shovel Co., Marion, O.  
Hayward Co., The, New York City.  
Marion Steam Shovel Co., Marion, O.  
Monighan Machine Co., Chicago, Ill.  
Osgood Co., Marion, O.  
Parsons Co., Newton, Ia.

## EXCAVATORS, DRAG-LINE

\*Bay City Dredge Works, Bay City, Mich.  
\*Pawling & Harnischfeger Co., Milwaukee, Wis.  
\*Sauerman Bros., Chicago, Ill.  
\*Smith Co., T. L., Milwaukee, Wis.  
Austin Machinery Corp'n., Chicago, Ill.  
Browning Co., Cleveland, O.  
Bucyrus Co., South Milwaukee, Wis.  
Byers Machine Co., Ravenna, Ohio.  
Clyde Iron Works Sales Co., Duluth, Minn.  
Economy Excavator Co., Iowa Falls, Ia.  
Erie Steam Shovel Co., Erie, Pa.  
Gade, C. L., Iowa Falls, Iowa.  
Hayward Co., New York.  
Industrial Works, Bay City, Mich.  
Link-Belt Co., Chicago, Ill.  
Marion Steam Shovel Co., Marion, O.  
Monighan Machine Co., Chicago, Ill.  
Osgood Co., Marion, O.  
Parsons Co., Newton, Ia.

## EXPANDED METAL

\*Truscon Steel Co., Youngstown, O.  
Berger Mfg. Co., Canton, O.  
Consolidated Expanded Metal Co., Braddock, Pa.  
Corrugated Bar Co., Inc., Buffalo, N. Y.  
Northwestern Expanded Metal Co., Chicago, Ill.  
Youngstown Pressed Steel Co., Warren, O.

## EXPANSION JOINT MATERIAL

\*Barber Asphalt Co., Philadelphia, Pa.  
\*Carey Co., Philip, Cincinnati, Ohio.  
\*Pioneer Asphalt Co., Lawrenceville, Ill.  
Texas Company, New York.  
\*Truscon Steel Co., Youngstown, O.  
\*Waring-Underwood Co., Philadelphia, Pa.  
Barrett Co., New York.

## EXPLOSIVES

Atlas Powder Co., Wilmington, Del.  
Du Pont de Nemours & Co., E. I., Wilmington, Del.  
Giant Powder Co., Cons., San Francisco, Cal.  
Hercules Powder Co., Wilmington, Del.

## FENCING

American Steel & Wire Co., Chicago, Ill.  
Anchor Post Iron Works, New York.  
Cyclone Fence Co., Waukegan, Ill.  
Frost-Superior Fence Co., Cleveland, O.  
Indiana Steel & Wire Co., Muncie, Ind.  
Kitselman Bros., Muncie, Ind.  
Page Steel & Wire Co., Bridgeport, Conn.  
Pittsburgh Steel Co., Pittsburgh, Pa.  
Stewart Iron Works Co., Cincinnati, Ohio.  
Texas Cyclone Fence Co., Fort Worth, Tex.  
Wickwire Spencer Steel Corp'n., Worcester, Mass.

## FILING EQUIPMENT, STEEL

Art Metal Constr. Co., Jamestown, N. Y.  
Berger Mfg. Co., Canton, O.  
Econ. Drawing Table & Mfg. Co., Adrian, Mich.  
Van Dorn Iron Works, Cleveland, O.

## FILTERS, OIL

Bowser & Co., Inc., S. F., Fort Wayne, Ind.  
Wayne Tank & Pump Co., Ft. Wayne, Ind.

## FILTERS, WATER

American Water Softener Co., Philadelphia, Pa.  
International Filter Co., Chicago, Ill.  
N. Y. Continental Jewel Filter Co., Nutley, N. J.  
Norwood Engineering Co., Florence, Mass.  
Pittsburgh Filter & Eng. Co., Pittsburgh, Pa.  
Roberts Filter Co., Darby, Pa.  
Scaife & Sons Co., W. B., Pittsburgh, Pa.

## FIRE ALARM SYSTEMS

Gamewell Fire Alarm Tel. Co., Newton Upper Falls, Mass.

## FIRE APPARATUS, MOTOR

Ahrens-Fox Fire Engine Co., Cincinnati, O.  
American-La France Fire Eng. Co., Elmira, N. Y.  
Brookway Motor Fire App. Co., Cortland, N. Y.  
Childs Co., O. J., Utica, N. Y.  
International Motor Co., New York.  
Pirsch & Sons Co., Peter, Kenosha, Wis.  
Prospect Mfg. Co., Prospect, O.  
Seagrave Co., Columbus, O.  
Stutz Fire Engine Co., Indianapolis, Ind.  
Waterous Fire Engine Co., St. Paul, Minn.

\* Indicates that the manufacturer carries an advertisement. See index facing inside back cover.

# GRADER AND DRAG BLADES

## also SCARIFIER TEETH

Made of high grade plow steel. We carry a large stock for all makes of road graders. We sell through Agents. Let us prove to you the merits of our product.

*Manufactured by*  
**Shunk Manufacturing Company, Bucyrus, Ohio**

## MAKE YOUR CONCRETE ROADS SMOOTH REPAIR THOSE CRACKS AND JOINTS WITH

# ROAD SOLDER.

TRADE MARK

MANUFACTURED AND SOLD BY

**THE WARING-UNDERWOOD COMPANY**  
COMMERCIAL TRUST BUILDING PHILADELPHIA, PA.

### WHY WASTE YOUR PROFITS?



The way to secure real profits on road construction is to push the work through quickly without idle time. One way to prevent loss of profits is to use the

#### BURCH Stone Spreader

For slag, stone or gravel, attached to the end of the truck, it will deposit material at required depth and width at half the cost of men, and pay for itself in a mile.

Let us tell you what other contractors have learned about it.

**THE BURCH PLOW WORKS CO., CRESTLINE, OHIO** Dept. E.

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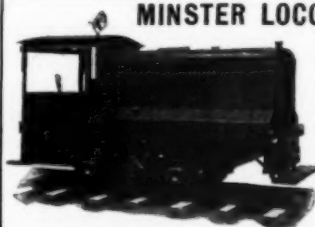
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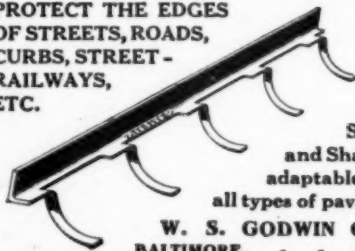
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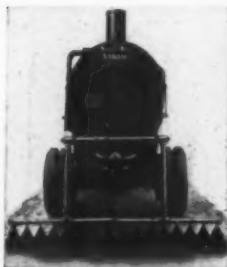
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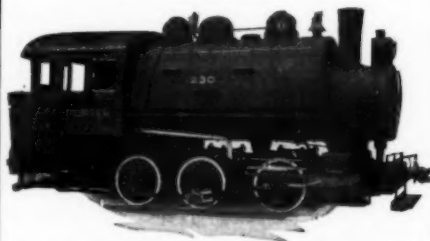
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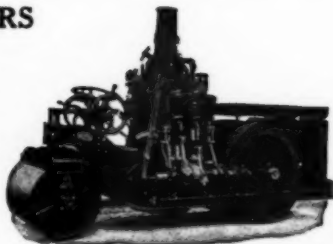
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Manistee Iron Wks., Manistee, Mich.  
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Schramm & Son, Inc., Chris. D., West Chester, Pa.  
United Iron Works, Kansas City, Mo.  
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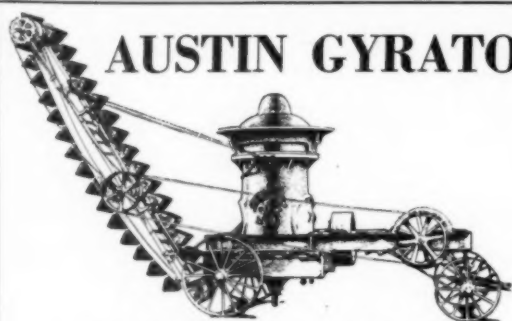
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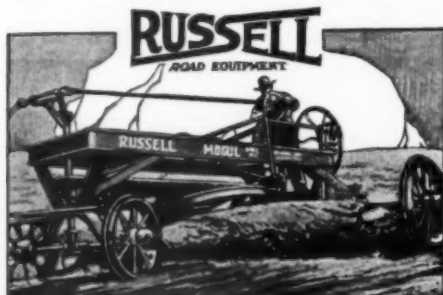
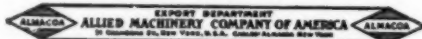
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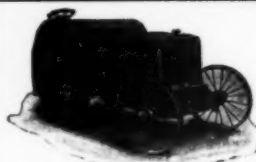
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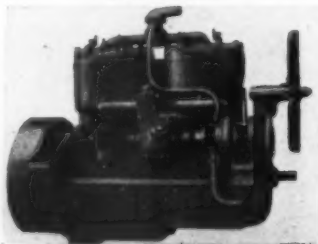
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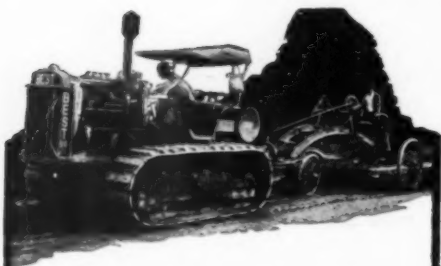
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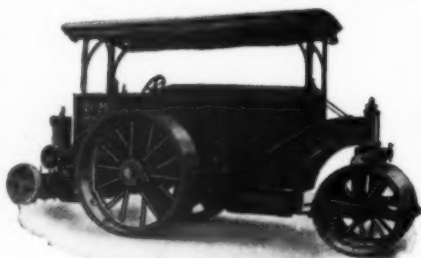
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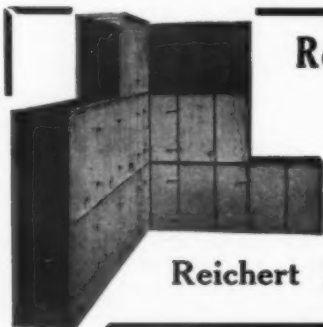
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 Granitex Corp., New York.  
 Horn Co., A. C., Long Island City, N. Y.  
 Master Builders' Co., Cleveland, O.  
 Minwax Co., Tbs, New York.  
 Protexol Corp., New York.  
 Ruberoid Co., New York.  
 Sonneborn Sons, Inc., New York.  
 Toeb Brothers, New York.  
 Truscon Laboratories, Detroit, Mich.
- WATER PURIFICATION**  
 \*Wallace & Tiernan Co., Inc., Newark, N. J.  
 Clow & Sons, J. B., Chicago, Ill.  
 Electro Bleaching Gas Co., New York.  
 N. Y. Continental Jewell Filter Co., Nutley, N.J.  
 Mathieson Alkali Works, Inc., New York.  
 Norwood Eng. Co., Florence, Mass.  
 Penna. Salt Mfg. Co., Philadelphia, Pa.  
 Permutit Co., New York.  
 Pittsburgh Filter & Eng. Co., Pittsburgh, Pa.  
 R. U. V. Company, New York.  
 Roberts Filter Co., Darby, Pa.  
 Scaife & Sons Co., Wm. B., Pittsburgh, Pa.
- WATER REGULATORS**  
 \*Union Water Meter Co., Worcester, Mass.  
 Mueller Mfg. Co., Decatur, Ill.  
 Pacific Flush Tank Co., Chicago, Ill.
- WATER SOFTENERS**  
 American Water Softener Co., Philadelphia, Pa.  
 Borromite Co., Chicago, Ill.  
 International Filter Co., Chicago, Ill.  
 N. Y. Continental Jewell Filter Co., Nutley, N. J.  
 Permutit Company, New York.  
 Pittsburgh Filter & Eng. Co., Pittsburgh, Pa.  
 Refinite Co., Omaha, Neb.  
 Roberts Filter Mfg. Co., Darby, Pa.  
 Scaife & Sons, W. B., Pittsburgh, Pa.
- WATER WHEELS**  
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 Leffel & Co., Jas., Springfield, O.  
 Pelton Water Wheel Co., San Francisco, Cal.  
 Smith Company, S. Morgan, York, Pa.
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 Milburn Company, Alex., Baltimore, Md.  
 Oxweld Acetylene Co., Newark, N. J.
- WELL SCREENS**  
 Cook, Inc., A. D., Lawrenceburg, Ind.  
 Johnson, Edw. E., Inc., St. Paul, Minn.
- WELL DRILLING AND BLAST HOLE MACHINES**  
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 Sanderson Cyclone Drill Co., Orrville, Ohio.  
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 Star Drilling Machine Co., Akron, O.
- WHEELBARROWS**  
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 Kilbourne & Jacobs Mfg. Co., Columbus, O.  
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- WINDOW FRAMES AND SASH.** (Metallic.)  
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 Bayley Co., Wm., Springfield, O.  
 Detroit Steel Products Co., Detroit, Mich.  
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- WIRE AND CABLE**  
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 Habirshaw Elec. Cable Co., Inc., N. Y. C.  
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 Macwhythe Co., Kenosha, Wis.  
 National India Rubber Co., Bristol, R. I.  
 New York Insulated Wire Co., New York.  
 Okonite Co., Passaic, N. J.  
 Roebbling's Sons Co., J. A., Trenton, N. J.  
 Safety Ins. Wire & Cable Co., New York.  
 Simpler Wire & Cable Co., Boston, Mass.  
 Standard Underground Cable Co., Pittsburgh, Pa.  
 Tubular Woven Fabric Co., Pawtucket, R. I.  
 Waterbury Co., New York.
- WIRE GLASS**  
 Mississippi Wire Glass Co., New York.
- WIRE MESH REINFORCEMENT**  
 \*Truscon Steel Co., Youngstown, O.  
 American Steel & Wire Co., Chicago, Ill.  
 National Steel Fabric Co., Pittsburgh, Pa.  
 Wickwire Spencer Steel Corp., Worcester, Mass.
- WIRE ROPE.** (See Rope, Wire.)
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 Ransome Concrete Mach. Co., Dunellen, N. J.
- WOOD PRESERVATIVES**  
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 Republic Creosoting Co., Indianapolis, Ind.  
 Truscon Laboratories, Detroit, Mich.
- WRECKING BARS**  
 \*Anderson Bros. Mfg. Co., Rockford, Ill.
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 Greene, Tweed & Co., New York.  
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Published Monthly at 154 Nassau St., New York, by The Civic Press, Inc.  
25 Cents a Copy. \$1.00 a Year. Printed in U. S. A.

*Branch* Chicago, Ill., 327 So. LaSalle Street. Tom Dix, Vice-President  
*Offices* San Francisco, 320 Market Street. W. A. Douglass, Pacific Coast Representative

Vol. V

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# Contractors' & Engineers' Monthly

Vol. V, No. 1

New York

July, 1922

## Financial Accounting for General Contractors

### Requirements for Successful Operation

**W**HEN discussing accounting methods with a contractor, it is not unusual for him to raise the objection that his business is different from others and, therefore, any cut-and-dried system of accounting for contractors is not practical and will not work in his business. That his business is different from others is true enough; but to suppose that accounting methods cannot be devised to fit his particular needs and prove "practical" in scores of different ways is far from being true. It is a commonplace of successful accounting practice that the installation and development of every system must be adapted in its details to the conditions, but that certain principles and certain basic records govern the account keeping in every business of the same type.

Accounting systems for manufacturers, when carefully adapted to the needs of a particular plant, give highly satisfactory results and prove managerial tools of such efficacy that when once tried they are seldom, if ever, dispensed with. Though a standard system of accounting does not yet exist for use in the general contracting business, there is no reason why its mechanism cannot be devised and the principles and methods of its application formulated. It is possible to control the operations of the contracting business with the same accuracy and relative economy as those of a manufacturer are controlled, when methods and records have been devised that apply to the contractor's needs.

The accounting system for contractors to be described in this book\* presents certain methods of record not hitherto formulated into a complete system. The primary aim of this system is the coordination and control of operations whereby the status of the various contracts, both individually and collectively, can be ascertained at any time. Secondary aims of the system are to furnish the contractor with the information of most value to him in the financing and management of his business, information which may be tabulated as follows:

1. The amount of cash in bank each morning.
2. The forecasted monthly receipts and expenditures.
3. The monthly anticipated sales—their net cost and net approximate profit.
4. The monthly and yearly earnings on contracts.
5. The monthly and yearly earnings on jobbing work.
6. The equity in open contracts and jobbing work unbilled and unrequisioned to date.
7. A forecast at each fiscal period showing the estimated net profits on unfinished contracts, such information being presented in a statement of the total amount of estimated unfinished contracts, from which is deducted the total estimated "Cost to Complete."
8. The total sales and total cost of sales for work performed in each state (if operations are carried on in several states), to facilitate the rendering of tax reports based on net profits earned during the fiscal year.
9. The liability to subcontractors for unfinished work, kept on distinct records, separate from the accounts of ordinary vendors, thus showing the absorption of the value of subcontract work in current costs.
10. A cumulative record of costs, showing (1) the classified units of each kind of material estimated and ordered to cover the contract, and (2) the estimated total labor and expense which is to be absorbed weekly, thus furnishing the estimated cost to finish. These records when finished are filed and become valuable as a reference for bids on repeat orders, or subsequent parallel contracts.

In addition to the foregoing information, the system includes a description of proper methods to be adopted for the control of field contract work on the books of the general contractor, and the control of the job fund. Complete instructions are given for the installation and maintenance of a field accounting system with a detailed symbol distribution of cost to be operated by the contractor's staff and controlled by only four book records.

The foregoing information covers all the requirements of the general contracting business, no matter how extensive may be the operations in an individual case.

\* "Practical Accounting for General Contractors," by H. D. Grant. Reviewed elsewhere in this issue. This opening chapter is reprinted through the courtesy of the publishers, McGraw-Hill Book Company, Inc.

### Cost Accounting Requirements

Contractual cost accounting requires as many, if not more, internal cost accounts than a manufacturing business, and some of these accounts are more difficult of manipulation. If the construction job is of any magnitude, the cost and income accounts may represent an array of items numbering thousands. Later in the discussion it will be seen that every detail of cost and income must be distributed in an accurate manner, and, at the same time, such distribution must be controlled, step by step.

The volume of detail entering into cost and income naturally increases with the extent of the operations. The monthly accrual of sales, the collectible accounts, the payments due vendors, the forecasted pay-roll, the true expense and cost, must all be shown in their truthful aspect. Vendors' invoices may come in monthly, by thousands. Hundreds of store-room orders may be issued each month, each of which must be segregated to the contract or job affected. In a large, active business, the purchasing and paying for material goes on constantly. And, in addition to the entries in the regular books of account, one must not lose sight of the fact that an important supplementary record, which must be kept up to date, is that in which are shown total costs and total income accruing in each state during each year, so that he may be taxed upon the annual net profit made within the boundaries of each state.

### Construction Contracts

Contract plans must be carefully prepared, after which they should be approved by all parties interested. The next step is the preparation of the specification. The specification is a document describing the materials to be used in the construction, stating how they are to be used and indicating how the various works are to be executed. Every portion of the work involved in the construction should be covered by this document.

The specification is written under the direction of the architect. Usually two copies of the paper are made; one copy is given the contractor, and the other is retained by the architect, who directs the preparation of an approximate estimate of the cost of the proposed work. The bills of quantities are prepared by a quantity surveyor. These generally become part of the contract and are specified as such therein.

Based upon the drawings made, the quantity surveyor estimates the materials required for the work, setting out the quantities of each in the form of a bill, made up on journal-ruled paper, to enable the contractor to price each item and to estimate the amount of labor involved. The idea behind this estimate is to arrive at a lump sum for which the contractor will undertake to do the work.

Before beginning construction activities, the contractor must sign a contract to the effect that he will, for a stated sum of money, undertake to carry out the work in accordance with the terms of the specifications, the draw-

ings, the bills of quantities and the instructions of the architect. Further, the contract should state that the work must be done to the entire satisfaction of the architect; it should specify the manner of carrying on the work and the responsibilities of the contractor. This last condition refers especially to clauses indemnifying the employer against accidents to employees and against numerous other risks. Likewise, the agreement should contain clauses relating to the completion of the work, the penalty for non-completion (the usual allowance being made for bad weather, fire or strikes), and should specify all payments to be made to the contractor as the work progresses. The requirements of each case will govern the contents of the contract made relative thereto. As a rule, the architect prepares this agreement. The essential features of contracts and the laws governing them are discussed in the last chapter of this book.

### Importance of Adequate Control

There is no reason why construction accounts should not be handled as accurately and expeditiously as accounts in other lines of business. Most accountants, for instance, are familiar with the accounting system of a small cloak and suit house which has its work done on a contract basis, and most of these houses have a system of accounts which is both accurate and satisfactory. But when we come to construction work, system and accuracy are not always encountered.

The contract undertaken by the Thompson-Starrett Company to erect the Equitable Building involved probably the expenditure of twenty millions of dollars; that of the George A. Fuller Company for the erection of the Pennsylvania Hotel involved at least a like sum. Each of these jobs took two years to complete, and millions of dollars were received and disbursed within that time. Unless works of such magnitude are controlled at every step by an accurate system of accounts, waste, leakages and excessive costs make it impossible for the contractor to keep within the estimated figures.

### Importance of Working Capital

If one wishes to become a successful general contractor, certain financial considerations, all of which are closely related to the matter of "working capital," should be borne in mind. In brief, these may be enumerated as follows:

1. The contractor must have ample working capital or the credit to procure that capital as it is required. In amount, this may reach 10 per cent or more of the total value of the work performed, plus the uncollected accounts accrued and due. Labor must be paid weekly, and vendors' bills fall due within a limited length of time, whereas collections at best do not come in more frequently than once a month, with a possible retention of part of the amount until final payment is made.

2. The contractor should know by forecast on the first of each month the extent of his obligations—what he has to expend during the current month, his collections from customers,

and the amount he can get on bank credit. The possible receipts should be more than enough to meet the necessary estimated expenditures. In computing possible receipts from customers, delinquents should of course be excluded.

3. Care should be observed in the purchase of materials, in order not to overburden the business with surplus stock. If goods are purchased in quantities on a low market and stored against future high prices, the saving should more than equal the standard rate of interest on the tied-up capital. Ordinarily, material should be purchased to meet the requirements of the contracts under way; in effect, this requires material to be delivered as the contracts are ready for their installation. Every dollar's worth of waiting material represents so much investment eating up interest. This fact is reflected in the charges for bank loans.

4. Overhead extravagance, administration and selling expenses, should be curtailed to the irreducible minimum, and compensation should be paid for capacity and effort only; incompetence of any kind should not be condoned.

The last recommendation enumerated above may sound like a counsel of perfection, easier said than done; but if the contractor keeps adequate records he should be able to detect extravagance and waste at their source and be in a position to recognize capacity and effort. In extreme instances, as when a piece of construction requires several years' time and the investment of millions of dollars before the work is completed, the force of the above remarks is perhaps better appreciated than where the job is only a small one. Yet the underlying principles in either case are the same; success or failure depends upon their proper application.

It is not uncommon for an authentic and reliable statement of a contractor's business to show a surplus and undivided profits equal to one-half the total assets and yet for the accounts receivable to be three times the amount of the liabilities to trade creditors. These obligations have to be paid during the current month, and the contractor has to renew

notes with his bank falling due during the month equal to 10 per cent of the anticipated collections. Such a condition is usually caused by the big "hold-back" in the form of the retention of part of the payments due on the requisition for work performed. A contractor doing work on requisition is never on even terms with his customer until the final payment is made; in the interim between the beginning and end of a contract, the amount retained on each requisition constantly accumulates, and this deferred income usually amounts to approximately 10 per cent of the volume of business done annually. As this retention is a necessary evil of the contracting business, the only remedy is to lift the burden from the contractor's shoulders to the broader back of the bank—an institution that is generally willing to carry it for due consideration.

In building and equipping a large vessel, for example, the time element may cover three or four years and the outlay may amount to several millions of dollars. The problem in such an extraordinary case is solved by throwing a large part of the burden of providing the expenses of construction upon the purchaser. Even with comparatively small pieces of construction this arrangement is customary. The construction contract may provide for the inspection and acceptance of the work when completed up to given stages, or at given intervals and for payment on account by the purchaser of a proportionate share of the contract price.

If such contracts were invariably made and adhered to, insolvencies in the contracting business would be less frequent, for there is scarcely any line of business in which bankruptcies are more numerous in proportion to the number engaged in the work. The explanation is nearly always the same; the working capital is not sufficient to "swing" its undertakings. This is a difficulty which is peculiarly apt to confront all enterprising, progressive and otherwise successful contractors. There is only one remedy—the caution engendered by an adequate accounting system.

## Book Reviews

### PRACTICAL ACCOUNTING FOR GENERAL CONTRACTORS

H. D. Grant, Staff of W. B. Richards & Company, Accountants and Engineers. McGraw-Hill Book Company, Inc., New York. 1922. First edition. IX + 254 pp. Forms and tables. Price \$3.00.

This book well fulfills its mission as a practical tool for the management of the contractor's business. Almost nothing has been prepared heretofore on a system of accounts to fit the needs of the contractor, so that this book should be a welcome supplement to the periodical literature on general contracting. Various chapters treat the subject logically and effectively, covering the requirements for the successful operation of general contracting, types of construction contracts, cost plus contracts, financial accounts and records, a figure analysis book, purchase and storeroom orders, recording income and expense, general ledger accounts, summary of sequence of operation, financial statements. The second portion of the book is devoted especially to field accounting control, covering cost accounts and unit costs, organization and personnel, classification

and symbolization of accounts, field accounting records, handling field papers, and the monthly report to the owner. The concluding portion of the book covers pay-roll problems, the control of equipment, the preparation of estimates and bids, municipal contracts, and the legal aspects of contracts. There is also an appendix containing forms for a lump-sum building agreement, a cost plus a fee agreement and a percentage-basis agreement.

### CORRESPONDENTS' BLUE BOOK—1922

Published by the Commercial Service Company, Inc., 23-31 West Forty-third Street, New York City, and 189 West Madison Street, Chicago. Price \$7.50.

A 125-page book of correspondents arranged alphabetically according to states, cities and correspondents' names, and including a classified index of the special qualifications of some of the correspondents in the technical, commercial, industrial, mining, agricultural and other fields. Of value to the advertising agency and the sales manager in securing trade data, making market surveys and getting other reliable trade information.



## Constructing an Asphalt Macadam Road by Halves

By John F. Gallagher

Contractor, Kingston, N. Y.

THE Ulster and Delaware Plank Road is the main highway through the Catskill Mountains. Consequently, during the summer months when vacationists and tourists through the summer resorts in these mountains, the Plank Road is subjected to a constant heavy traffic which demands a well-constructed, lasting wearing surface. The first step in the improvement of this highway was taken in 1900, when a water-bound macadam pavement, 6 inches in thickness, was constructed, utilizing local bluestone exclusively. In 1910, the old water-bound macadam was surface-treated by the writer with asphaltic road oil. For the decade immediately following, this wearing surface gave excellent service, but finally, in 1921, it was deemed necessary as a result of the rapidly growing number of visitors to this region during the vacation months to further improve the highway. So, during the summer of 1921, a 2-inch asphalt penetration macadam wearing surface was added to the old road.

It was considered advisable at this time to widen the old road to 16 feet, which meant an addition of 4 feet to the old pavement. The length of the road is 2.8 miles. The old road was scarified and wherever necessary new stone was added to bring the old water-bound macadam to the desired thickness. The extra 4 feet was then added and after proper rolling the base was ready for the new wearing surface.

The work was done during the summer, and at that time the road was being subjected to the usual summer traffic, so that it was impossible to close it during construction. At the suggestion of James H. Sturtevant, Division Highway Engineer of the New York State Highway Department, we decided to lay the road by halves, admitting traffic to one side while the other side was being constructed. A 2 by 4 liner was placed in the center of the highway to confine traffic to one half and to support the new construction on the other. The work proceeded in stretches of 1,000 feet.

We used local bluestone, of which there was an abundance in the immediate vicinity of the work, crushing it in our own crusher to 1½ inches. When laid and rolled, the wearing surface was 2 inches in thickness. Texaco asphalt was the binding material used. One



THE ROAD DURING AND AFTER CONSTRUCTION

and three-quarter gallons of asphalt were applied to the square yard, and over this were spread ¾-inch screenings, also derived from local bluestone. Over this we distributed a seal coat of Texaco asphalt, using ¾ of a gallon to the square yard. After this was done, the road was immediately opened to traffic.

### Paddle Your Own Canoe

Every contractor must, finally, stand or fall upon his own knowledge of costs and bidding methods. It will not do to rely upon somebody else's figures.

—Henry H. Wilson.

## Legal Decisions in the Contracting Field

Edited by A. L. H. Street, Attorney-at-Law

### Damages Recoverable for Prevention of Contract Performance

Having before it a suit to recover damages sustained by plaintiff through being prevented from carrying out a contract for the construction of a bridge for defendant county, after the work had been partly performed, the Washington Supreme Court said in the case of *Davis vs. Thurston County*, 205 Pacific Reporter, 840:

"Where the contractor, as here, does not seek to recover any profits lost because of being prevented from completing his work, he would be entitled to recover such proportion of the whole contract price as the amount of the work done by him before the contract was terminated bears to the whole amount of work to be done under the contract. For example, if he has completed one-half of all the work to be done, he would be entitled to recover one-half of the contract price."

### Compensation for Unexpected Difficulties in Performing Contract

Holding that a contractor constructing a dam was not entitled to recover on account of the work's proving more expensive than was mutually expected when the contract was entered into, the New York Court of Appeals observes in the case of *Foundation Company vs. State of New York*, 135 Northeastern Reporter, 236:

"A contract and specifications may contain representations as to existing physical conditions. If so, a bidder may rely upon them, even though it be provided that he shall satisfy himself by personal inspection and investigation as to their truth, where because of time or situation such investigation would be unavailable; or statements may be made on which the bidder, because of the language of the contract, cannot rely. Then if they are made in good faith he takes the risk of their accuracy. Such is the situation here, even if we assume that the boring sheet was one of the documents upon which the bidder was entitled to base his bid. There was no bad faith. There was, so far as appears, an honest mistake on the part of the officers of the state. And the contractor agrees to make no claim because any estimate, test, or representation affecting the work made by any such officer is erroneous. . . .

"If, however, notwithstanding the agreement as to honest mistake damages might be recovered from the state for misrepresentations, upon which the bidder might rely, the boring sheet was not such a representation. It formed no part of the plans upon which the contract was based. . . . It was an independent bit of information or supposed information in the possession

of the state, to which the bidder resorted in making the investigations which it was required to make. If it relied upon this paper, it did so at its own risk."

### Limitation of Cost of Buildings on Changes Being Made

Modification of a contract to erect a one-story building, by adding a basement and second story, does not abrogate a provision limiting the cost of the first story, holds the Wisconsin Supreme Court in the case of *Brockman vs. Werner*, 186 Northwestern Reporter, 589. The Court holds that a lower court "erred when it found that the agreement to build the basement and second story upon a cost plus basis abrogated the written contract to build the first story at a cost not to exceed \$32,000. It is true that a number of changes had to be made in the first story owing to the addition of a basement and second story, but such changes, in so far as they increased the cost, would be extras, to be paid for on cost plus basis, and, in so far as they decreased the cost, as, for instance, the omission of a roof, such decreased cost should be credited to the defendants" (the owners).

### Time for Filing Notice of Lien of Contractor

In the case of *Gill vs. Mullan*, 116 Atl. 563, question was raised before the Maryland Court of Appeals as to whether there had been timely filing of a grading contractor's notice of lien under a statute requiring the notice to be filed within sixty days after furnishing the work. The notice was not filed until November 4, although the contractor had removed his steam shovel and other implements from the site of the work early in August. But it appeared that he afterwards removed a large tree and a 12-ton rock, which was necessary to constitute completion of his contract, and this work was not finished until October 23. This, the Court holds, showed that the notice was served in time; finding that the delay in completing the work continued in good faith, and not as a mere pretext for delaying filing of the lien.

### County Bridge Contractor's Liability for Accidents

A contractor constructing a bridge for a county was not immune from liability for injury to a motorist caused by driving against an obstruction negligently left in a highway by the contractor's employees, on a theory that since the county and its officers, etc., are not liable for such accidents the contractor is not liable. This is the gist of the holding of the Iowa Supreme Court in the case of *Grennell vs. Cass County et al.*, 187 Northwestern Reporter, 504. The Court also said:

"It may be conceded for the purposes of this appeal, that an independent contractor, who performs the work undertaken by him according to the terms of his contract and the plans and specifications furnished for his guidance, does not become liable in damages to any third person suffering injury by reason of any mistake, fault or defect in such plans or specifications. But this exemption from liability does not extend to his own negligence."

#### **Unexpected Difficulties in Doing Work Do Not Give Rights Against the Owner**

Plaintiff contracted with the Port Commissioners at New Orleans to construct pile foundations for certain buildings on the banks of the Mississippi. On completion of the work plaintiff demanded reimbursement for extra expense entailed by unexpected difficulties encountered in driving the piles. The difficulty consisted in encountering a very hard stratum in the soil.

The Louisiana Supreme Court holds that no valid claim existed, especially in view of the fact that plaintiff failed to protest rulings of the engineers within ten days as required by the contract, and omitted to examine the location before bidding on the work as suggested in the notice to bidders, and in view of the further fact that the contract specified that "no additional compensation would be allowed if unusual difficulties are encountered." (*O'Leary vs. Board of Port Commissioners*, 91 Southern Reporter, 139.)

#### **Damages Recoverable for Delay in Delivering Contractors' Equipment**

There is a fundamental rule of law which limits one's liability for breach of contract to such damages as were reasonably within the contemplation of the parties to the contract at the time of the making of the agreement. But special damages are recoverable when so contemplated. Applying these principles in the recent case of *Builders' Supply & Equipment Corporation vs. Gadd*, 111 Southeastern Reporter 771, the North Carolina Supreme Court holds that where equipment is sold to a contractor with knowledge on the part of the seller that it is needed in the performance of work for which the contractor has a contract, the seller is liable for loss sustained by the contractor in being deprived of use of the equipment on account of the seller's failure to deliver within an agreed time. In this case the buyer showed that performance of road construction work was rendered more expensive through his being required to use drag-pans while waiting for wheelers bought from the seller.

#### **Contractor Not Liable for Accidents After Control of Premises has Ceased**

That a sidewalk may have been left in defective condition after defendant had practically completed a tunnel construction contract did not make defendant liable to plaintiff for injury

sustained by the latter on account of the defect, where the city for which the tunnel was constructed had resumed control of the street and sidewalk, holds the Massachusetts Supreme Judicial Court in the case of *Cunningham vs. T. A. Gillespie Co.*, 135 Northeastern Reporter, 105. The Court holds that after the engineer had issued to defendant a certificate of completion of the tunnel, defendant had no further control over the sidewalk. "The control having ceased, the responsibility to travelers upon the highway, and third person, also ceased," added the Court.

#### **Damages Recoverable Against Contractor on Account of Defective Work**

Applying to a contract to construct a reservoir for a city the rule applied by the courts generally to all sorts of construction contracts, the United States Circuit Court of Appeals, Sixth Circuit, in the case of *City of Cleveland vs. Walsh Construction Co.*, 279 Federal Reporter, 57, adopts the following statement by a lower court as an accurate summary of legal principles:

"In some cases, where the structure is a total loss, due to the defective materials or faulty workmanship of the contractor, and the owner elects not to reconstruct according to the original plans and specifications, but in another location and upon new and different plans, the measure of damages is held to be the amount paid to the contractor for the original structure. . . . Upon the facts here found, this rule obviously is not applicable, because, if the location and design of the original structure had been sufficient, the loss from faulty workmanship would have been slight and easily remedied.

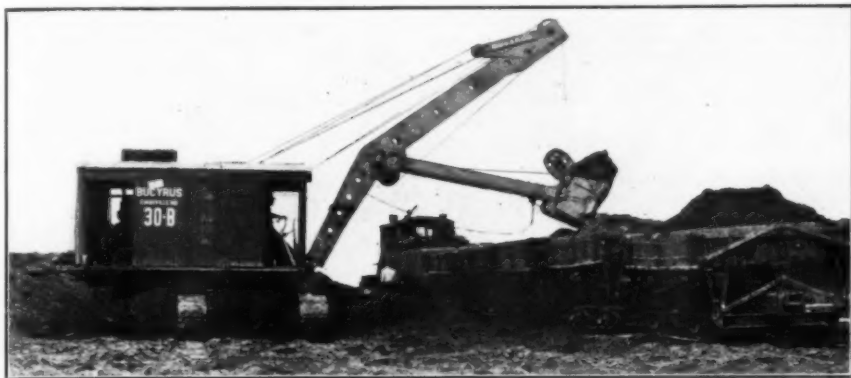
"The measure of damages properly to be applied is that applicable to a contract which has been substantially performed but into the performance of which have entered defective materials or faulty workmanship, or departures from the plans and specifications. In cases of this character, two rules have been applied, depending somewhat upon the circumstances of each case. One is that the contractor is entitled to recover the contract price diminished by the difference between the value of the building to the owner in its defective condition, and its value if perfectly constructed. This rule is applied whenever the structure or building is useful to the owner in its defective condition and it is neither fair nor reasonably practicable to remedy the defects by the making of repairs. In other words, where there is a failure to complete the work, and such failure may reasonably be remedied by the expenditure of additional labor and materials, or where the defects are of such a character that they may be fairly and reasonably remedied by the expenditure of labor and materials, the proper rule seems to be to deduct from the contract price such sums as would be reasonably necessary to complete the work according to the contract or to make such repairs."

## A Diesel-Engine-Operated Shovel

**A** FEW months ago announcement was made by the Bucyrus Company, South Milwaukee, Wis., that it had added to its line of products a gasoline shovel of a distinctly novel and improved type, in which it was possible to operate the thrust without the use of the independent shovel mounted on the boom. Recent developments have enabled this company to use a Diesel-type engine on this shovel. The importance of this lies principally in the

hour. This means a fuel cost of  $10\frac{1}{2}$  to  $13\frac{1}{2}$  cents per hour or, roughly, between \$1 and \$1.25 per day of average operation.

A steam shovel operating under like conditions would burn about  $1\frac{1}{2}$  tons of coal in ten hours. With coal at \$6 per ton delivered, this means a daily fuel cost of not less than \$9, or a saving of \$8 per day on fuel alone through the use of the Diesel-engine-operated shovel. To this saving may also be added the cost of



**A GASOLINE SHOVEL WITH CRAWLING TREAD**

reduction of fuel costs. The new shovel, known as the Bucyrus 30-B oil shovel, uses any cheap low-grade oil of high heat value, that will flow freely. The saving in cost of fuel has been demonstrated with severe tests, which this machine has undergone for several months under strenuous winter conditions, both as a shovel and as a drag-line. The tests have shown that with fuel oil at 6 cents per gallon the machine will consume  $1\frac{1}{4}$  to  $2\frac{1}{4}$  gallons of fuel oil per

the team for hauling water, and other incidental expenses. The resulting savings should pay the wages of the operator for the day with a considerable balance to spare. This shovel may readily be converted into a drag-line excavator or a clam-shell machine.

The engine used is of the full Diesel type with mechanical injection, developing 55 horsepower at a speed of 360 r.p.m. This heavy-duty, low-speed engine has 8 by  $10\frac{1}{2}$ -inch cylinders.

## Surety Bond Service for Contractors

**A** CONTRACT bond, to put it briefly, is a guarantee that the terms of the contract will be carried out. Of late years there has been a noticeable increase in the demand for surety bonds in connection with contract work of nearly every kind. This may be laid to a growing realization of the value of these bonds among owners and those who advance money for building operations. Nowadays, one seldom hears of any important construction work in which the owner or owners have not protected themselves by requiring the contractor to give a bond. The contractor, in turn, more often than not, demands bonds of a subcontractor.

The Fidelity and Deposit Company of Maryland, Baltimore, Md., makes a specialty of furnishing contract bonds. Among the instructions issued to its agents with particular regard to contract bonds are these two significant sen-

tences: "The agent's duty to his client is to see that he gets prompt and efficient service. He must make himself valuable to his client and render a service worth his commission."

As a service to its clients, this company frequently supplies contractors with advance information on lettings, both local and in other states. In addition to this, a branch office is maintained in Washington, which makes a specialty of aiding bidders and contractors on contract work. No charge is made for this service, nor are any obligations incurred by those who make use of the facilities of that office. Information of every kind on Government contracts is furnished, and bidders' blanks are supplied upon request. Complete and accurate instructions are issued for the preparation of bids, as it is a well-known fact that improperly prepared Government bids have lost many a con-

tract. All errors are checked, and care is taken in the Washington office to see that bids are correct in every respect. Personal attention is given to the filing of all papers and to all matters which may require special attention of the various departments of the Government. First reports on bids opened may be furnished by wire to the successful bidders.

In addition to this, arrangements for bidding by telegraph may be made. In order to avail himself of this service, the contractor gets in touch with a local representative of the Fidelity and Deposit Company, who will wire the Washington office. This office will then submit the contractors' bid, providing a bid bond is used instead of a check. Contractors are thus enabled to take advantage of the latest market quotations and the very latest estimates, just as if their offices were located in Washington.

There are, unfortunately, many small contractors who have difficulty in keeping straight the financial end of their business. In such

cases, agents of this company are generally able to advise the contractor to show him the danger of taking more work than his finances warrant; the importance of making financial arrangements and protecting himself in his material prices before bidding on a contract; the dangers of scattering his work or undertaking too many contracts at a time; the importance of keeping his funds in his contracting business and sticking to that business rather than venturing into different lines with which he is not familiar.

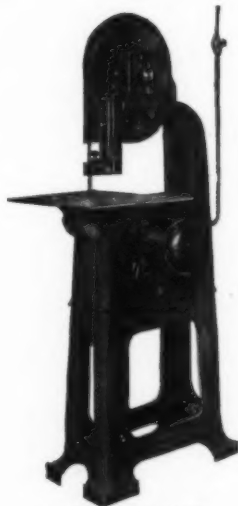
Another important service rendered by the Fidelity and Deposit Company is the prompt execution of bid or proposal bonds. These bonds take the place of certified checks, which contractors are generally called upon to deposit with their bids. It often happens that these certified checks are for large amounts, and bids are held for a number of weeks. During this time these tied-up assets draw no interest, so that the bid bond can truthfully be said to effect a saving to the contractor.

## A Portable 16-Inch Band-Saw

**A** NEW 16-inch band-saw which has a number of special features and which can be operated on an electric lighting circuit has recently been brought out by J. D. Wallace & Company, 1401-1417 West Jackson Boulevard, Chicago, Ill. This outfit is equipped with disc steel wheels, which are more durable and accurate and which furnish a larger factor of safety than the ordinary spoke wheel. It is equipped with ball bearings throughout, even the upper and lower guides being of the ball-bearing type, the saw running on the periphery of the roller. Another special feature is the totally enclosed electric motor, which is built into the machine and directly connected with the lower wheel by a fabroil gear and steel pinion. Both gears run in oil to insure perfect lubrication and a quiet-running machine. Centrifugal force throws this oil into the bearings and keeps them well lubricated.

The table is a flattened and ground steel plate 19 by 21 inches. It is mounted on a large rocker bearing which can be adjusted to any angle from 45 degrees to minus 5 degrees. An indicator is provided to show the angle at which the table is tilted. The table is mounted in a very simple manner and can be taken off easily and quickly. Safety guards are built into the machine and are a standard part of it. All adjustments are controlled by hand wheels or thumbscrews without the use of special tools or wrenches.

The height of this new Wallace bench 16-inch band-saw is 5 feet 9 inches over-all, and the table is 42 inches from the floor. The floor space required is only 15 by 29 inches. The motor is a 1/2-horse-power General Electric, ball bearing, and runs at 1,750 revolutions per minute. The saw runs at 3,150 feet per minute. The blades used are of special steel properly treated and specially cut so as to serve the greatest number of producing hours on this



A COMPACT, SAFE,  
PORTABLE BAND-SAW

size wheel.

Practically every wood-working shop and every contractor can use one of these small band-saws to advantage, and there are many places where a band-saw of this size and character will fill a positive requirement. It is totally enclosed, assuring safety to the operator, is portable, and operates on an electric light circuit, so that it can be taken to the job, thus saving time, labor and power. The easy, quick adjustments assure accuracy, and it is built to handle any stock from the smallest pieces to the hardest wood 8 inches thick.



## The Use of Compressed Air in Road Construction

EVERY road-building project that entails the excavation of rock makes an imperative call for the provision of machine drilling equipment, for only by taking full advantage of such economies can the contractor make a bid which will both secure him the work and at the same time give him a margin of profit. On work of any magnitude compressed air has long been recognized as a factor of prime importance, but on the short-time job and the work that moved from day to day, in times past, the contractor could not justify the provision of an air compressor of stationary type. Now a portable air compressor and drills place machine drilling at his service on any job large or small.

With few exceptions, the road builder's rock-drilling problem finds its most satisfactory an-



A PORTABLE COMPRESSOR UNIT OPERATED BY A FOUR-CYLINDER GASOLINE MOTOR

	Piston Type	"Jack-hammer"
Number of drills.....	3	3
Number of drill operators.....	3	3
Number of helpers.....	3	0
Kind of rock.....	altered gneiss	
Average depth of holes, feet.....	18-25	
Daily drill hole footage per drill, feet..	70	120

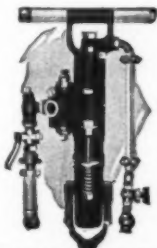
While the "Jackhammer" is ordinarily operated from an independent air plant, it is quite common for steam shovel operators to run it on steam from the shovel boiler or on air from an auxiliary compressor mounted on the shovel.

### Portable Air Compressors

In road building, the source of air power for drilling may well be a portable compressor outfit, for it relieves the contractor of the cost, in time and labor, of setting up, tearing down and moving a non-portable unit, and also does away with extended pipe lines, boiler plants and other impediments. A portable rig is in every way to be desired in preference to a stationary outfit.

For true portability the compressor should be of light weight, yet rigidly constructed so that it can be taken over rough country without being damaged. Gasoline motor drive is preferred, because gasoline fuel is available everywhere, and there is no difficulty in obtaining a competent operator, as anyone who is familiar with an automobile can handle the automobile type of engine.

As a single drill power-plant, it is possible that a skid-mounted compressor may be pre-



AN AUTOMATICALLY ROTATED HAND HAMMER DRILL

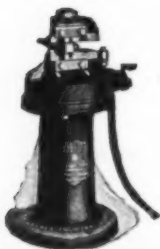
swer in a light-weight self-rotating hand hammer drill. Such a machine can put down holes 6, 12 or 20 feet, according to its size, and yet is so easily handled that the holes can be drilled at any angle and in any place that affords a foothold for the drill runner. Hand drills are the accepted standard, not only for the light work such as the removal of outcropping ledges, but for heavy excavation, bench work and tunneling.

In building a Virginia highway involving the grading of 13 miles of mountain road, the contractor employed an Ingersoll-Rand portable compressor and two "Jackhammers." Where there was a day's drilling without moving the compressor, the contractor averaged 300 to 400 feet of drill hole at a cost of less than 5 cents per foot. The holes varied from 1 to 10 feet in depth, drilled in hard limestone formation.

A radically different problem was offered in the making of a deep rock cut to lower the grade of a New York City cross-town street. The contractor first employed piston drills and later changed over to "Jackhammers," with the following result:



A PORTABLE DRUM HOIST FOR USE WITH EITHER AIR OR STEAM



**ROCK DRILL STEEL SHARPENER  
FOR RESHARPENING BITS  
AND MAKING SHANKS**

ferred to a road portable machine. An outfit of this kind is fully self-contained, yet lightweight and handy enough to permit convenient loading and unloading when being moved on the contractor's truck. Where electric current is available, a motor-driven compressor may be employed, retaining all the advantages of easy movement with the added convenience of simple electric drive.

When the volume of rock excavation is such that a large number of drills are to be employed, a power-producing unit of greater capacity will be needed. If less than five drills are in use, it is the common practice to utilize a stationary compressor of the single-stage horizontal type, driven either by motor or by direct-connected steam engine. More air can be had and more drill equipment operated with a duplex compressor, again with the choice of either steam or power drive. Such a unit, of course, requires some provision of foundation, but there are self-contained rigid types which one often sees running at full load when merely bolted to a heavy timber support. This is of decided advantage in a temporary installation.

#### Drill-Sharpening Machines

Second only to the drills and their source of operating power is the matter of choosing and preparing bitted drill steels which will enable the machines to work at full efficiency. Machine drill sharpening is of such advantage in making perfect bits and shanks and in resharpening dull steels to the same degree of perfection, that the contractor who is using only three or four drills can profit by installing a drill sharpener. The drill will have plenty of sharp steel and hence will work faster, steels will not stick nor holes be lost, and the work at the sharpener will proceed so fast that either a smaller blacksmith force will suffice or the smith will have spare time to devote to other work.

Numerous instances are on record of cases where machine drill sharpening has reduced the cost 6 or 8 cents per bit under the lowest figure which hand sharpening established. As an instance, a contractor in Connecticut employing four "Jackhammer" drills and hand-sharpened steel was losing money. The drills were in trouble most of the time with stuck steels and rifled holes. It required 18 or 20 steels to bottom 6 feet. The installation of a No. 33

Ingersoll-Rand "Jacksteel" Sharpener made the job a paying proposition, as will be noted from the following table:

	Hand Sharpening	Machine Sharpening
Size drill steel.....	$\frac{3}{8}$ -inch hollow hexagon	$\frac{3}{8}$ -inch hollow hexagon
Diameter starting bit.....	$2\frac{1}{4}$ inches	$1\frac{3}{4}$ inches
Gage variation.....	$\frac{3}{4}$ -inch	$1/16$ -inch
Size powder.....	$1\frac{1}{4}$ -inch	$1\frac{1}{4}$ -inch
Depth holes.....	6 feet	6 feet
Steels per hole.....	18-20	3
Blacksmith shifts.....	2 8-hour	1 8-hour
Blacksmiths.....	2	1
Helpers.....	2	1

#### Hoists

To take full advantage of compressed air on the job, the road-builder can advantageously employ "Little Tugger" drum hoists to take care of the odd jobs of hoisting, handling and hauling. Many a contractor has saved a lot of time and labor by applying one of these hoists to skid timber, hauling cars, and handling culvert forms.

#### Pavement Cutting

It is an unnecessary expense to slowly cut asphalt or bitulithic pavement with pick or chisel and sledge, or break up concrete by hand, when this type of pavement must be removed for one reason or another. Not only is the hand method laborious, but it is wasteful in that quite often the opening created is larger than the occasion requires. Pneumatic methods and tools have put pavement cutting on a new basis. They cut clean, work fast, and remove only the portion of paving necessary.

For asphalt pavement cutting, the tool in general use is a pneumatic machine fitted with a sharp-bladed chisel. The method of procedure is as follows: first, a marking cut is made by sliding the chisel along the chalked cutting line; next, the chisel is used to cut down and through; and lastly, it is used to pry up the slabs removed. In a very few instances it has been found preferable to employ a heavy chipping hammer with a narrower chisel. This, however, is largely dependent upon the character of the paving material.

In breaking concrete pavement the contractor can fit a "Jackhammer" drill with a bull-point steel, remove the rotating mechanism, and do admirable work. This procedure was widely followed by the contractors who encountered work of this kind in building the New York subways.

Recently there has been developed an air tool similar in many respects to the "Jackhammer." This machine, known as the "Paving Breaker," is light in weight and of sturdy construction. It is non-rotating, fitted with a steel retainer and a convenient throttle located in the handle. Shank steels with moil bits are used to break up the pavement.

An alternate tool is "The Imperial Tamper," but with the same bull-point pick. The Superintendent of the Elmira Railway Light and Power Company estimates that four of his men broke up about 600 square feet of asphalt pavement in a 10-hour shift, using these pneumatic machines. Where concrete occurred under the asphalt, the use of the pneumatic picks was relatively a greater saver of time and labor than in cutting asphalt.

# The Uses and Adaptability of Hollow Tile in Building Construction

By Charles C. Crockatt

Chief Engineer, Hollow Building Tile Association, Chicago, Ill.

**I**N hollow tile construction there are two types or schools, namely, end construction, in which the units are designed to lie in the wall with the cells in a vertical position, and side construction, in which the units are de-

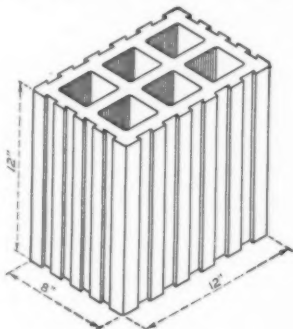


FIGURE 1

signed to lie in the wall with the cells in a horizontal position. The standard sizes of units in end construction are 6x12x12, 8x12x12, 10x12x12 and 12x12x12 for load-bearing purposes. The standard sizes of units in side construction are 4x5x12 and 8x5x12 for load-bearing purpose. These units are illustrated by Figures 1, 2 and 3. It is possible to build walls in any of the commonly recognized thicknesses required for building construction, as illustrated by Figures 4 and 5, with modifications of these for any wall thickness. In building a tile wall, it is obvious that there is a considerable saving in labor over other types of construction because of the size of the units. Still, they are not so large as

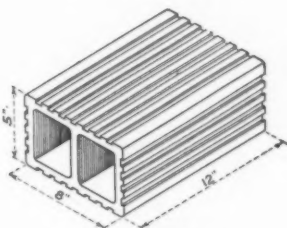


FIGURE 2

to become a handicap, which is evidenced by the ease and skill apparent in the action of the masons when at work.

As a masonry wall building unit, hollow tile lends itself readily to the severest test, which is illustrated by Figure 6, showing the back view of a complicated fireplace and heating unit chimney. It will be noticed that the center flue, which is 12x12, leads from the fireplace itself in a straight vertical position, and permits ample space for the 8x12 boiler flue, in addition to two ventilating flues. The register at the left is a vent provided to permit the escape of cooking gases and odors from the

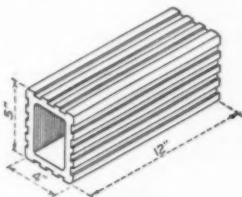


FIGURE 3

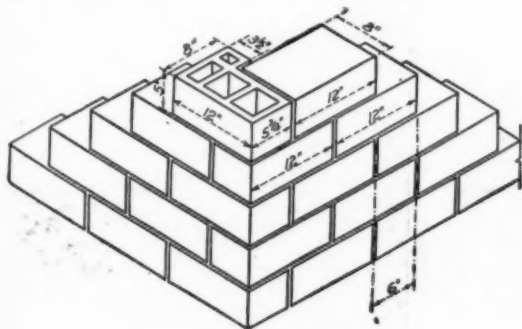


FIGURE 4

gas range. Figure 7 is a front view of the same fireplace and chimney after the tile has been erected. This is a difficult chimney to build, because of its small size for the number of flues which it contains.

An easy way to build lintels over openings in tile walls is to clip the top shells and intermediate webs of both ends of each tile that is to be used in the lintel, except the two end pieces, in which only one end of the tile should be clipped, leaving the two sides and the bottom shells intact. When these cut tile are placed end to end, it will be seen that there is a small hole in the top shell at each joint.

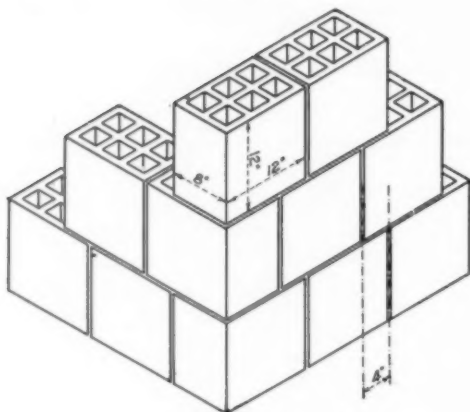


FIGURE 5

On small window openings and average door openings these cut tile can be placed end to end at the desired elevations, and depend on the frame for support until the lintel is completed. In a large window opening it will be necessary to place an upright brace to help support the tile and concrete until the concrete has had an opportunity to set. These supports should be placed approximately 3 feet on sections, and should be left in place for a week or ten days. In the bottom cells of the tile, place reinforcing steel (the size and quantity depending upon load and span) and then pour the concrete into the tile lintel through the holes provided at each joint, as previously described. With the use of a small stick the worker can

puddle the concrete, if it is of a dry consistency, until all the air bubbles are worked out of the tile, which assures one that all the cells are completely filled with concrete. This method of pouring a reinforced tile lintel in place over the opening on the wall is the simplest way of taking care of lintel construction in connection with tile walls. The old method was to pour the lintel on the ground, after standing the tile in an upright position several days in advance of actual use on the job, and then hoist the lintel into place, necessitating the use of a derrick or some similar means of elevation, which was very cumbersome in addition to being unsatisfactory and expensive. By pouring the lintels in place on the wall, it is possible to go on immediately with the work above the lintels, and as rapidly as is consistent with the plans of the job. On openings which do not have a window or door frame, all

that is necessary is to lay a plank underneath the tile, supported by uprights to hold the lintel in place until the concrete has set.

Some of the uses of hollow tile are in foundations, exterior and interior load-bearing walls, interior partitions, curtain walls of steel and concrete skeleton construction, fireproofing for beams, curtains and columns, floor construction, such as flat arch, segmental arch and combination system, furring tile, and in

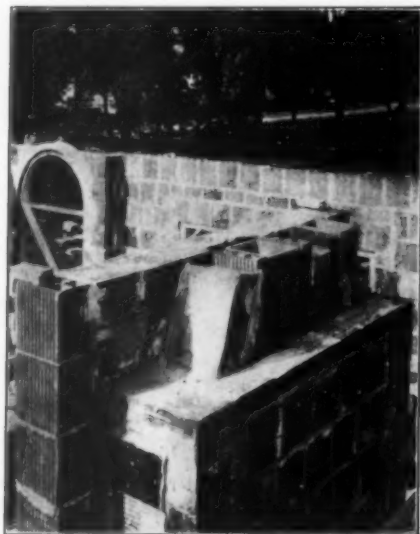


FIGURE 6

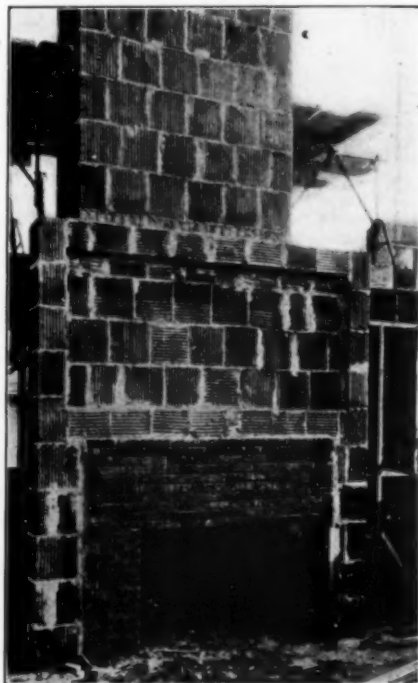


FIGURE 7

roof and ceiling construction, in residences, store buildings, apartment houses, factories, flat buildings, warehouses, farm buildings, schools, churches, and garages.

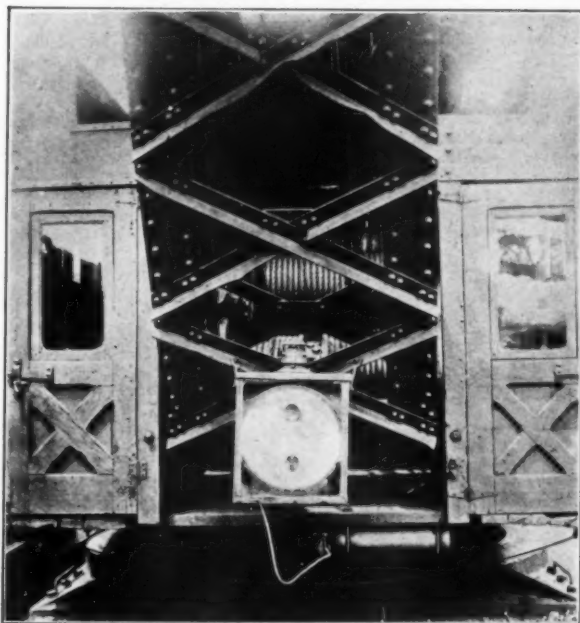
## An Acetylene Flare for Contractors

A TIMELY article on the use of acetylene flares by contractors appeared in the January issue of **CONTRACTORS' AND ENGINEERS' MONTHLY**. The accompanying photograph illustrates a type of acetylene flare that was not described in this article.

This flare, as will be observed, is bolted to the base of a revolving crane, so that it will always be directed toward the work, and its gas supply is drawn from a small dissolved-acetylene tank supported by metal hangers. The tank is the familiar Prest-O-Lite acetylene cylinder, such as is extensively used in auto truck and motor-cycle lighting, and when empty is exchangeable for a full tank at any of the 22,000 service stations in the United States. It is easy to handle, contains enough gas for several nights, and can be detached and replaced in a moment at intervals of two or three times a week, as required.

If large volumes of the gas are used, the cost of dissolved acetylene is greater than that of gas direct from the carbide, but the gas consumption of flare lights is small—at most a few cubic feet an hour, and anything that contributes to greater convenience more than offsets any possible increase in the expense of light maintenance, which would be negligible in any case.

Acetylene flare lights of the type shown, so devised that they are portable, like a lantern,



FLARE MOUNTED ON BASE OF REVOLVING CRANE

are also used by contractors. These lights, compact and very simple, have tremendous lighting power and range compared with the ordinary oil light, and have burnished parabolic reflectors that can be instantly adjusted to retain any desired position and direction of reflection. They comply with the most exacting safety demands, will remain lighted in the stiffest gale, and stand up under such every-day use as is given equipment of the kind.

## Will Railroad Rates Come Down?

ONE of the elements which leads to the belief that lower prices will prevail in building construction is the hope that railroad rates on building material will be reduced. It is repeatedly pointed out that the cost of transportation compared with the value of the commodity transported is so high on material for construction as compared with other general commodities as to be positively exorbitant. Even a short haul on open-car material, such as sand and stone, rather more often than not increases the cost of the material at the delivery point to double its value at the source. An axiom of railroad rate-making is to charge all the traffic will bear, but it has never yet been

recognized that to move a commodity at a rate even slightly more than the actual cost of operation is better than not to move it at all, particularly if the haul does not mean an increase of train mileage.

At a recent meeting of the Contractors Association, St. Joseph, Mo., Arthur Lehr, one of the members, said in part: "I have in mind a 22-mile haul on crushed stone. The price, f.o.b. quarry, is \$1.25 per ton and at delivery point it had jumped to \$2.05. Delivery from track-age to job adds another 35 cents."

The traffic will bear it, of course, since there is no cheaper source of supply, but the public will not bear it, that is, they will not build.





## An Adjustable Shore for Building Construction

Simple Device Adds to Safety of Construction and Is Economical

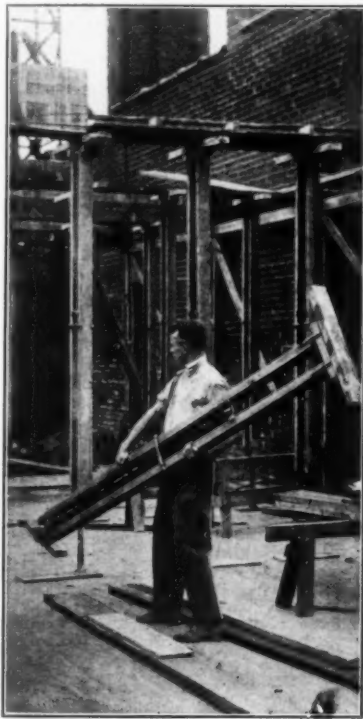
**A** VERY simple adjustable shore for supporting forms in concrete building construction is manufactured by the H. W. Roos Company, Cincinnati, Ohio. It consists of but two moving parts and is readily erected by two carpenters.

A head block is securely strapped to two upper members of 2x4 long leaf yellow pine lumber dressed on all sides. Between these upper members, and guided by a head guide of heavily ribbed malleable iron, runs a 1½-inch steel pipe, having a malleable iron base securely riveted to the pipe. In order to fit the shore, it is only necessary to raise the upper member and jack it into place with a simple hand jack which slips on and off. The yokes at the base of the upper members clamp the pipe tightly, increasing the grip with increased load. This pair of clamping yokes is made of malleable iron, so designed that the load exerts three times as much pressure as is necessary to overcome friction, being an

automatic lock which cannot slip.

Manufacturers claim that 80 per cent of the cost of shoring is saved through the use of these self-locking, adjustable shores. They are 8 feet long when collapsed and 14 feet when fully extended, thus taking care of about 98 per cent of all shoring needs. Each one weighs 60 pounds, so that one man can readily carry it about, which makes it less bulky than the average 4x4 shore.

The safe working load is about 3,000 pounds, and the shores are used with the same spacing and cross-bracing as for 4x4's. The self-locking feature makes the grip of the self-locking device increase with the load, thus preventing slipping. One of the great conveniences is the absence of loose or detachable parts to be lost. The shores are all of one size, so that it is unnecessary to have a number of piles of different lengths of shores for any given job. No wedges are necessary with them, therefore each replaces a 4x4 shore, two



CARRYING SHORE TO POSITION



RAISING UPPER MEMBER



MAKING FINAL ADJUSTMENT



RELEASING THE SHORE

wedges and a block. The wooden upper member permits nailing all bracing, beam bottoms, stringers, etc., and it is claimed that two to

four carpenters can set up more shores with this simple apparatus than twelve carpenters can with 4x4 shores.

## Grading to Help Nature Clear the Roads of Snow

### A Cooling Thought for Summer

**I**N carrying out its Federal Aid road projects in flat and gently rolling country, Wyoming uses a unique plan of grading, so that the wind will keep the road-bed practically clear of snow. The reviewers of Federal Aid projects at the Bureau of Public Roads of the United States Department of Agriculture discovered that in many Wyoming projects the grade line was laid at all points above the natural surface of the ground. Hills were planned even where the ground profile showed a natural knoll.

The explanation was that the grades were kept high in order to utilize the winter winds for snow removal. For six or seven months each year there is likely to be snow, which is generally accompanied by wind. It is well known that any part of a roadway that is be-

low the surface of the surrounding ground will drift full of snow to a depth equal to the height of any near-by object above grade. In a state like Wyoming, where the snow remains on the ground for such long periods and where distances are great, the expense for snow removal would be heavy, out of all proportion to the light traffic.

The Wyoming plan is to build the grade at an elevation slightly above the sage-brush and weeds, and above the normal surface of the snow as it would fall on the adjacent land without wind. In many cases it may be necessary to build a fill even on the top of knolls and high points. The method involves greater grading costs, but there is much to recommend it because of lower maintenance charges in winter.

# ASSOCIATED GENERAL CONTRACTORS

## NEWS NOTES AND COMMENTS

### Business Recovery and Rising Prices

**A** LONG with the appreciable increase in all business this year over that of last year, we are experiencing a trend of rising wholesale prices. Based on an analysis of 36 kinds of business activity, 28 of them have records that exceed last year's, and even for the lowest on the list,—that of locomotive shipments,—while the output for the year has been very small, totaling only 30 per cent of 1921, the orders on hand now greatly exceed those at this time last year.

The following figures show the percentage increase of business this year over that of 1921. These figures are for the first five months of this year, compared with the same period last year, except in the case of those indicated by a double star, which show figures compared for the first four months of each year.

It is since January that the general level of wholesale prices has gone up 7.2 per cent, but one-half of that increase occurred last month. It must be explained that the entire list of index numbers of wholesale prices of the Bureau of Labor Statistics has been recomputed for each month since 1913, and has been revised by the introduction of new commodities, a regrouping of commodities, and a reweighting on the basis of relative quantity of production as shown by the 1919 census, in place of the weighting formerly used, based on the 1909 census. The new index places the average level of wholesale prices about ten points lower than the old one. The new index shows the general price level for May at 148, while, according to the old one, it would be about 158, both figures being in per cent of the 1913 level.

The biggest change in the new index is in the group of building materials, old figures for April being 201, while the new are only 156. The figures for May show that building materials have increased from 156 to 160.

The following table shows for 13 groups of commodities the date and amount of the previous low figure since the 1920 peak, the figure for

#### Business Activities

1922 in  
Per Cent  
of 1921

Fabricated structural steel sales, 1,000 tons....	284
Oak flooring 1,000 ft. BM.....	240
**Enameled baths shipped.....	225
M. C. pine produced 1,000 ft. BM.....	224
**Pneumatic tires produced, thousands.....	212
**Rubber consumed for tires, 1,000 lbs.....	207
Lead receipts, St. Louis, 1,000 lbs.....	191
Contracts awarded, 1,000 sq. ft.....	178
**Abrasive paper and cloth sold, reams.....	178
Douglas fir production, 1,000 ft. BM.....	166
Sugar melted, 1,000 long tons.....	155
**Enameled sinks shipped.....	147
**Enameled lavatories shipped.....	144
Steel ingot production, 1,000 tons.....	141
Western pine produced, 1,000 ft. BM.....	137
Zinc production, 1,000 lbs.....	134
**Butter, receipts of five markets, 1,000 lbs.....	126
Cotton consumption, bales.....	120
Cement shipments, 1,000 barrels.....	117
Pig iron production, 1,000 tons.....	116
Silk consumption, bales.....	115
Cars loaded, thousands.....	109
Coke produced, 1,000 tons.....	108
Cement production, 1,000 barrels.....	108
**Gasoline, 1,000 gallons.....	106
Cattle slaughtered, thousands.....	105
New life insurance issued, \$1,000.....	105
Bituminous coal produced, 1,000 tons.....	101
Hogs slaughtered, thousands.....	96
**Pullman passengers carried, thousands.....	93
Magazine advertising, 1,000 lines.....	93
Panama Canal traffic, 1,000 tons.....	90
**Vessels in foreign trade entering U. S. ports, 1,000 tons.....	83
Sheep slaughtered, thousands.....	79
**Oleomargarine consumed, 1,000 lbs.....	68
Locomotive shipments.....	30

May, and the change from the previous low in number of points on the 1913 scale, and in per cent from the previous low figures. Lumber has gone up 14 per cent since August, steel 10 per cent, and all building materials 7 per cent since their lowest figures.

In addition to lumber, other increases occurred in cast iron pipe, lead pipe, copper wire, cement and steel. Brick and hollow tile show no change. This is the first time, however, since August, 1920, that brick prices have not

#### RECENT INCREASE IN WHOLESALE PRICES

	Lowest Recent Figures		May		Increase	
	Month	Index	Month	Index	Points	Per Cent
Farm products .....	June	114	132	18	15.8	
Foods .....	Jan.	131	138	7	5.3	
Clothing .....	Aug.	171	175	4	2.3	
Metals .....	Mar.	109	119	10	9.2	
Building materials .....	Mar.	155	160	5	3.2	
Lumber .....	Aug.	151	172	21	13.9	
Brick .....	Apr.	199	199	0	0	
Structural steel .....	Mar.	96	106	10	10.4	
Other building materials .....	Apr.	149	160	11	7.4	
Chemical and drugs .....	Feb.	123	122	— 1	— .8	
House furnishing goods .....	Apr.	175	176	1	.6	
Miscellaneous .....	Apr.	116	116	0	0	
All commodities .....	Jan.	138	148	10	7.2	

shown some reduction, and the cessation of this slow downward movement probably presages an increase.

### A. G. C. Biographies

*A. P. Greensfelder*, after graduating in Civil Engineering from Washington University in 1901, was for one year in charge of electric railway construction in Kansas. He then spent four years as Construction Engineer of the Terminal Railway Association of St. Louis, since which time he has held his present position of General Superintendent and Secretary of the Fruin-Colton Contracting Company of the same city. Mr. Greensfelder has taken a great interest in engineering societies, being a past president of the American Society of Engineering Contractors, and an associate member of the American Society of Civil Engineers. He is also a member of the St. Louis Railway Club and the St. Louis Chamber of Commerce, and an enthusiastic member of the A. G. C., believing the Association has a wonderful opportunity for service, not only to general contractors, but to the construction industry nationally. At the present time Mr. Greensfelder is a vice-president of the Associated General Contractors of America.

*Sumner Sollitt*, the present head of the Sumner Sollitt Company, was brought up with no other end in view than that he follow construction work. As a family, the Sollitts have been in the construction business for several generations, the present company carrying on continuously in Chicago under the name of Sollitt, in one form or another, since 1835, always holding its place as a successful, reputable and responsible firm on work of magnitude and diffi-



**SUMNER SOLLITT**

culty. After finishing high school, the young man was trained in the various building trades, primarily masonry, carpentry and the pipe trades, naturally falling into the position of general foreman and afterwards general superintendent. In its preferred line of work, industrial buildings, the Sollitt Company has been very successful, because no more work has been undertaken than could be superintended, financed and expedited properly. While the firm is primarily a Chicago organization, its construction work has extended to practically all the main cities of the United States. Special pride is taken in the fact that on work intrusted to it without competition the completion and settlement have always been made without criticism or charge of extravagance, and on work for the War and Navy Departments during the World War, amounting to millions of dollars, there were no adverse criticisms. The achievement of erecting the first officers' training camp, at Fort Sheridan, containing 86 buildings, to house 5,000 men, completed in 10 days, was remarkable. Mr. Sollitt is a Vice-President of the A. G. C.



**A. P. GREENSFELDER**

### Equipment Lease Out

An equipment lease that constructors are willing to sign as either lessee or lessor has just been issued by the Associated General Contractors of America. Its object is to establish on a basis of common equity those obligations and responsibilities properly involved in renting construction machines, and to provide a simplified rental agreement which will insure absolute fairness to both parties. Thus a principle universally acknowledged and generally applicable, though too infrequently followed in the construction industry, will be given a practical test.



# GET THESE GOOD CATALOGS

The catalogs and pamphlets listed below are available for free distribution. Contractors and Engineers who check over these pages each month and write for such material as interests them, will find this a valuable means of keeping up to date on the subject of machinery and equipment.

## MATERIAL-HANDLING MACHINERY

Contractors having any kind of material-handling problems will do well to write to the Weller Manufacturing Company, 1820-1856 North Kostner Ave., Chicago, Ill., and secure this company's general catalog, which will be beneficial in getting an insight into modern machinery for material handling.

## TRACTORS FOR ALL JOBS

The C. L. Best Tractor Co., San Leandro, Calif., will send to any contractor interested its catalog and folders describing the many jobs contractors have handled with Best tractors.

## FINISHING AND BUSHING TOOLS

Hand and pneumatic surfacing and bushing tools are described in the Contractors' Supply Folder, which may be secured from Thomas B. Dallett Co., Philadelphia, Pa.

## TRUSTWORTHY ENGINES FOR CONTRACTORS

The catalog of the Climax Engineering Co., 1 W. 18th Ave., Clinton, Ia., is a valuable directory of labor-saving machinery which should be in the hands of every contractor, as it lists many machines equipped with Climax engines.

## TRACTORS FOR MANIFOLD JOBS

The variety of jobs, large and small, which are handled by a Cletrac industrial tractor, are described in literature which may be secured from the Cleveland Tractor Co., 19211, Euclid Ave., Cleveland, Ohio.

## REDUCED WATER CONSUMPTION

Valuable information on how meters reduce water consumption without checking the use of water as needed, is given in literature which may be secured from the Neptune Meter Co., 50 E. 42nd St., New York City.

## QUOTATIONS ON PORTLAND CEMENT

Prices on genuine "Pennsylvania" cement, which is made only by the Pennsylvania Cement Co., 131 E. 46th St., New York City, may be secured by interested contractors on request.

## FILLER ASPHALT FOR BRICK PAVEMENTS

The Pioneer Asphalt Co., Lawrenceville, Ill., is able to quote low prices and immediate delivery on any quantity of high-grade asphalt filler for brick pavements.

## FINDING LEAKS IN WATER-MAINS

The Pitometer method of locating leaks in water-mains and thus checking waste and reducing loss to water departments is described in detail in literature which may be secured from the Pitometer Co., 52 Church St., New York City.

## THREE STYLES OF CONTRACTORS' PAIS

Iron Horse Metalware Catalog No. 921, issued by the Rochester Can Co., Rochester, N. Y., describes three styles of pails regularly used by contractors.

## A ROAD MACHINERY CATALOG YOU NEED

The Russell Grader Manufacturing Co., Minneapolis, Minn., maker of seven sizes of graders and two sizes of elevating graders, as well as scarifiers, planers, finishers, dump wagons, culverts, and steel beam bridges, describes its products in a catalog styles of pails regularly used by contractors.

## SCARIFIER TEETH AND GRADER BLADES

The Shunk Mfg. Co., Bucyrus, O., will be glad to furnish the names of agents through whom it sells its high-grade plow steel grader and drag blades and scarifier teeth for all makes of road machines.

## TERRY CRANES AND DERRICKS

The Terry Mfg. Co., Grand Central Terminal, New York City, will furnish to contractors full details regarding any of its types of cranes and derricks, which have been well known in the contracting industry for over a quarter of a century.

## A CONCRETE HARDENER AND ACCELERATOR

A new liquid calcium chloride known as Konax, for accelerating the setting and for hardening concrete, is described in a folder recently issued by the Semet-Solvay Company, Syracuse, N. Y.

## AN IMPROVED TYPE OF CHLORINE CONTROL APPARATUS

Wallace & Tiernan Co., Inc., Newark, N. J., has recently brought out a new vacuum type chlorinator for controlling the supply of chlorine to municipal water-supplies for the elimination of disease bacteria.

## ASPHALT REPAIR FOR CONCRETE ROADS

The Waring-Underwood Co., Commercial Trust Bldg., Philadelphia, Pa., will be pleased to send to any contractors or municipal officials interested full information regarding its "Road Solder," which has been particularly developed for the repair of cracks and joints in concrete roads.

## ASPHALT ROAD CONSTRUCTION

Warren Brothers Co., Cambridge St., Boston, Mass., will be pleased to send to any interested contractors full information regarding Warrenite bitulithic pavement for road and street construction.

## USED EQUIPMENT FOR SALE

The Grey Steel Products Co., 111 Broadway, New York City, has on its list a number of locomotive cranes, motor trucks, caterpillar steam shovels and caterpillar ditchers in good condition for quick sale. Full information on request.

## A VERSATILE TRACTION STEAM SHOVEL

Contractors may secure a complete description of the Model 4 14-ton, all-steel Keystone excavator with a 1/2-yard skimmer and a 14-foot reach, from the Keystone Driller Co., Beaver Falls, Pa.

## A NEW MODEL ROAD TRACTOR

The Little Giant road tractor, in two sizes, 16-22 h.p. and 26-35 h.p., is described in literature which may be secured from the Little Giant Co., 231 Rock St., Mankato, Minn.

## STREET FLUSHERS AND SPRINKLERS

City officials, purchasing agents and contractors will be interested in the literature of the Municipal Supply Co., South Bend, Ind., describing the South Bend street flusher, which has proved its effectiveness and economy in municipal work.

## CLEAN YOUR WATER-MAINS

Any official sending his address to the National Water Main Cleaning Co., Hudson Terminal Bldg., New York City, will secure interesting and valuable information regarding the National method of cleaning water-mains, which greatly increases their capacity and reduces pumping costs.

## A PROVED AND ACCEPTED EXPANSION JOINT

The Philip Carey Co., 9 Wayne Ave., Lockland, Cincinnati, O., will be glad to send free samples and specifications of Elastite expansion joints for concrete roads and sidewalks to any interested contractor.

**TAR KETTLES THAT DO NOT LEAK**

One of the bad features of many tar kettles is the leaks which waste tar and asphalt. The illustrated catalog of Conner & Co., Inc., 4000 N. Second St., Philadelphia, Pa., describe the well-known Conner tar and asphalt heaters, which have been proved non-leakable because of the welded joints.

**EXPEDITING ASPHALT ROAD REPAIRS**

The Lutz surface heater, which softens asphalt and other bituminous material, making possible perfect bonds in the repair of sheet asphalt pavements, is described in detail in the illustrated literature of the Equitable Asphalt Maintenance Co., 901 Campbell St., Kansas City, Mo.

**TANDEM PAVING ROLLERS**

A road roller guaranteed against breakage or wear for five years and known as one of the best is described in detail in the illustrated literature of the Erie Machine Shops, Erie, Pa.

**SPEED DUMP-TRUCKS FOR ROAD WORK**

The General Motors Truck Co., Pontiac, Mich., in announcing its one-ton dump-truck has offered to road builders a valuable aid, as the truck is fitted with a special dump body operated by a horizontal hoist. Full details may be secured by writing for the latest GMC truck catalog.

**STEAM PILE HAMMERS**

The National Hoisting Engine Co., Harrison, N. J., has issued a 32-page catalog describing its complete line of National pile hammers and illustrating the variety of services in which they have proved their worth.

**LOW-CHARGING CONCRETE MIXERS**

Building contractors particularly will be interested in the Keystone mixer, which is power-loading and low-charging, and which has an automatic water-measuring tank that is positive in action. Full specifications and description may be secured from the Gray Iron Foundry Co., Reading, Pa.

**TRENCH BRACES**

The Duff Manufacturing Co., Pittsburgh, Pa., in its 20-page illustrated booklet describes the use of Duff-Dunn pavement trench braces, which speed up the placing of sheathing and materially cut trenching costs.

**CALCULATING MACHINES FOR CONTRACTORS**

The Monroe Calculating Machine Co., South Orange, N. J., has published a special booklet, "Results," devoted to the uses of the Monroe calculating machine by contractors. This booklet contains a number of interesting stories of the actual value of these machines in contracting work and a number of letters from contractors who find them invaluable.

**ROAD ROLLERS CUT RESURFACING COSTS**

The Buffalo-Springfield Roller Co., Springfield, O., in its catalog A, gives complete information regarding the services of road rollers with scarifier attachment for all types of road repair and reconstruction.

**RECORD-BREAKING ROCK DRILLS**

Waugh clipper drills which established a world's record in shaft making by making 427½ vertical feet of 3-compartment shaft in 31 days at Eureka, Utah, are described in the Clipper booklet, which may be secured from the Denver Rock Drill Mfg. Co., Denver, Colo.

**METER BOXES FOR PROTECTION**

Increasing the protection of meters during freezing weather is made possible by the use of Ford meter settings, which are described in detail in the literature of the Ford Meter Box Co., 414 S. Carroll St., Wabash, Ind.

**REAL SATISFACTION IN HAND SHOVELS**

The remarkable results and general satisfaction experienced by all road contractors who are using Pittsburgh shovels justify your asking for quotations on this quality shovel made by the Pittsburgh Shovel Co., Pittsburgh, Pa.

**FOUR-CYLINDER GAS ENGINES**

The Novo Engine Co., Lansing, Mich., has recently placed on the market a series of new gasoline engines of the 4-cylinder, 4-cycle type, known as the Novo Type F in models AF and CF. Literature on these models may be secured free on request.

**ILLUSTRATIONS OF STEAM-SHOVEL PERFORMANCE**

In catalog 189, the Marion Steam Shovel Co., Marion, O., illustrates the many services to which its sturdy dependable steam shovels and dredges are put, besides giving data on performance.

**ALL-AROUND DUMP-TRUCKS**

Full information regarding Autocar dump-trucks in 1½- to 2-ton, 2-ton and 5-ton sizes for all kinds of contractor's hauling, may be secured from the Autocar Co., Ardmore, Pa.

**LONG-WEARING CONSTRUCTION PAINTS**

Booklet No. 148-B issued by the Joseph Dixon Crucible Co., Jersey City, N. J., describes this company's long-wearing pigment, flake silica graphite and lined oil paint for structural metals which are exposed to the weather and unusually hard service.

**DUMP BODIES AND HYDRO-HOISTS**

The new portfolio on "Road-Building Equipment" issued by the Heil Co., 1243 25th Ave., Milwaukee, Wis., describes some of the many fleets of trucks with Heil dump bodies and hydro-hoists, which have proved so economical in contracting work.

**TROUBLELESS LOCOMOTIVES**

Locomotives which have been standard for over 55 years and which are found on contracting jobs throughout the country, are described in the latest literature of the H. K. Porter Co., Pittsburgh, Pa.

**ASPHALT ROAD ROLLERS**

Iroquois tandem rollers, made in three sizes, of 2½-ton, 5-ton and 8-ton, are described in detail in the latest price list of the Barber Asphalt Co., Land Title Bldg., Philadelphia, Pa.

**A NEW SPECIFICATION HANDBOOK**

Contractors interested in securing a copy of the new 104-page architect's specification handbook on waterproofings, damp proofings and technical coatings, should write to H. G. Doering, Truscon Laboratories, Detroit, Mich.

**A CATALOG OF ROAD-BUILDING MACHINERY**

The C. D. Edwards Mfg. Co., Albert Lea, Minn., in its new catalog No. 45, describes in detail its complete line of well-built, long-lived, road-building machinery, including scrapers, graders, concrete mixers, etc.

**METAL PERGOLAS AND COLUMNS**

The Union Metal Mfg. Co., Canton, O., has issued an attractively illustrated booklet describing its metal pergolas, garden fixtures, columns and lighting standards, which should be of considerable interest to contractors contemplating work of this type. Ask for catalog No. 17-P.

**A NEW GASOLINE SHOVEL BULLETIN**

The Thew Shovel Co., Lorain, O., has just issued a new Bulletin 602 in its series on Type 00 gasoline shovels for economical and efficient dirt moving. This bulletin may be secured free on request by readers of the CONTRACTORS' & ENGINEERS' MONTHLY.

**A RAPID TRANSPORT TRUCK**

The new Model 15 Transport truck, made by the Transport Truck Co., Mount Pleasant, Mich., is described in detail in a new 8-page booklet, which may be secured free on request by interested contractors.

**ELIMINATING WASTE IN BLASTING**

A new 56-page book under the title above has just been issued by the Advertising Dept., Hercules Powder Co., Wilmington, Del. This book tells how some progressive companies are preventing waste in blasting and contains chapters on planning the work, drilling, choice of explosives, advantages of No. 8 blasting caps, use of stemming and preventing waste in firing.

**GYRATORY STONE CRUSHERS**

Catalog 29F, issued by the Austin-Western Road Machinery Co., Chicago, Ill., illustrates and describes its entire line of Austin crushers, screens, elevators, cars and hoists, and gives plans for successful complete crushing and screening plants.

**PROFIT IN STONE SPREADERS**

A stone spreader that it is known will save its own cost in a short time is described in literature which may be secured from the Burch Plow Works Co., Dept. E, Crestline, O.

**ASPHALT PAVING TOOLS**

The catalog and price list of Littleford Bros., 500 E. Pearl St., Cincinnati, O., contains descriptions and illustrations of its complete line of asphalt paving tools, including tampers, smoothers, shovels, rakes, tool heaters, tar kettles, pouring pots, brick filling pots and carrying pots.

**BOTTOMLESS POWER SCRAPERS**

Pamphlet No. 16, just issued by Sauerman Bros., 1143 Monadnock Bldg., Chicago, Ill., describes completely its bottomless power scrapers, which fill a real need in material handling for gravel- and sand-pit operators.

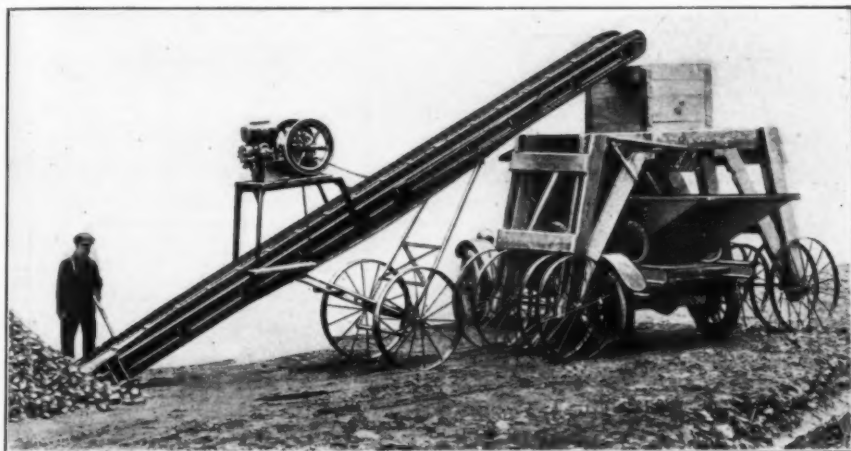
## Material-Handling Machinery for Concrete Roads

WITH a tremendous concrete road building year in progress and many others ahead, contractors are figuring every way to handle material efficiently and at the lowest possible cost.

The Portable Machinery Company, Passaic, N. J., has developed a complete material-handling unit consisting of a contractors' type scoop conveyor especially designed to handle abrasive materials, a portable measuring hopper, and an auto dump-truck. This outfit handles all the material up to the concrete mixer and is claimed to cut the usual shovel

back to the measuring hoppers, they are filled and ready to discharge their next load.

The conveyors and measuring hoppers are easily moved backward and forward, and thus kept in close contact with the piles of materials scattered along the roadway. On large jobs it is advisable to use more than one auto dump-truck, especially if a speedy concrete mixer is used or if the mixer and the measuring hoppers are located far apart, but on small jobs one conveyor, one hopper and one truck should be used. In this case the stone and sand should be placed close together along the roadway



A PORTABLE CONVEYOR LOADING BATCH BOX. THE DUMP-TRUCK IS SHOWN BELOW THE BOX READY FOR ITS LOAD

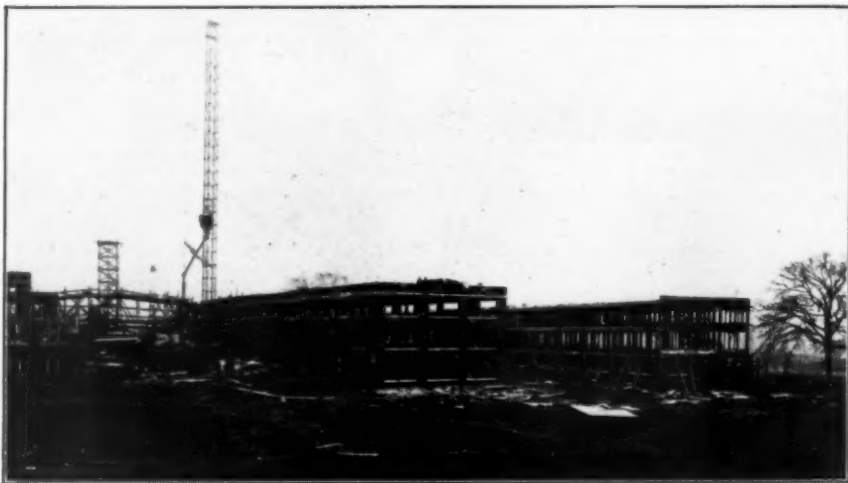
and wheelbarrow gang by ten or twelve men and keep the mixer operating at full capacity.

In operating this trio, stone is first delivered in suitable piles along the roadway. One conveyor, with a measuring hopper, is assigned to the crushed stone, and a duplicate outfit to the sand and cement. These measuring hoppers are adjustable in size in order to provide for mixtures of different proportions. The man in charge of the stone-handling outfit fills his hopper with the desired proportion of stone, and the man in charge of the sand and cement handling outfit does the same with his material. After the measuring hoppers are charged, the dump-truck operator drives under the stone hopper and receives the charge of stone, after which he goes to the sand and cement hopper and takes these materials on top of the stone. The load is then driven to the concrete mixer and discharged into the mixer hopper. By the time the driver comes

so that both materials can be fed into the conveyor. One man is required to feed the stone to the conveyor and a second man to feed the sand and cement. The man handling the sand feeds a certain number of shovelfuls to the conveyor, then he stops and adds the cement, while the man feeding the stone continues feeding until the hopper is full. If desired, the cement can be added at the mixer skip. The ideal outfit is two conveyors, two mixer hoppers, and two auto dump trucks. This provides a double unit, and if anything goes wrong with any part of one unit, the second unit will always keep the mixer going and push the job along.

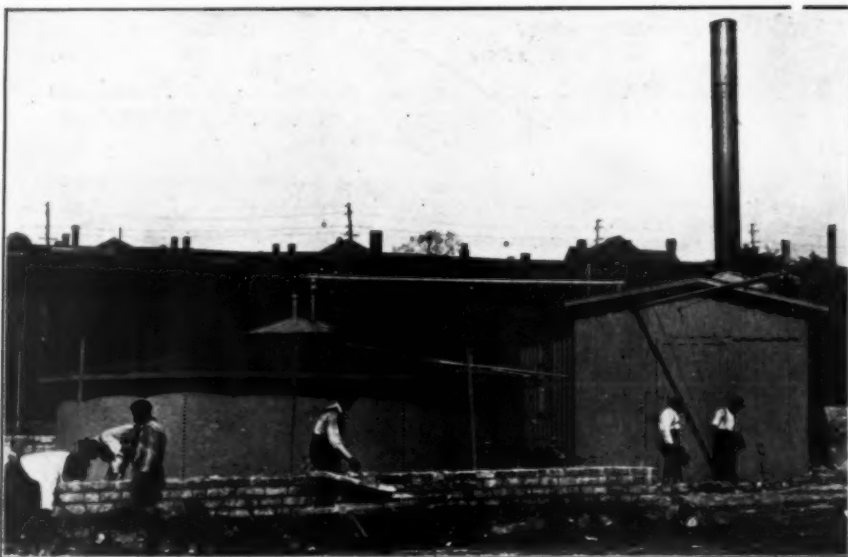
Again, it may be desirable at certain intervals to use one of the conveyors to handle stone or sand from railroad cars and from storage piles to the trucks that must first convey these materials to points along the roadway.

## Equipment for General Contractors



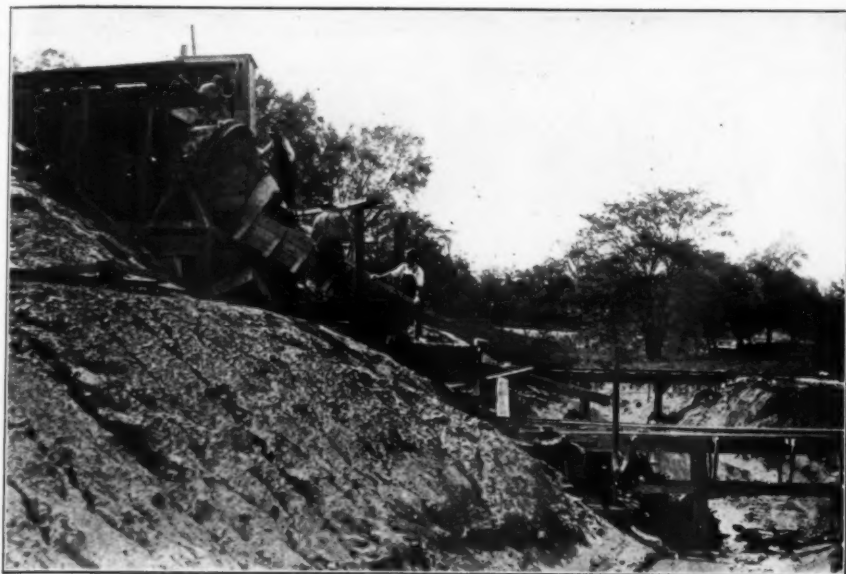
### BUILDING THE GOVERNMENT TUBERCULOSIS HOSPITAL AT WEST ALLIS, WIS.

The above photograph, taken April 25, 1922, marks the completion of all reinforced concrete work on the buildings of the new Government tuberculosis hospital at West Allis, Wis., on the National Soldiers Home grounds. The contractors, H. Schmitt & Son, Inc., Milwaukee, Wis., have constructed the five buildings, having a total of 10,000 cubic yards of reinforced concrete. The actual concrete work, with the necessary reinforcing, was performed in 62 working days. Rather a remarkable record, considering that most of the work was done during winter weather. The machinery, most of which was sold by Boeck-Lowe Machinery Company, Milwaukee, Wis., consists of two  $\frac{1}{2}$ -yard, 160-foot Insley steel towers, with 50-foot counterweight boom plants (one of which is shown in the illustration), standard Smith non-tilting concrete mixers, and Orr & Sembower electric hoisting units



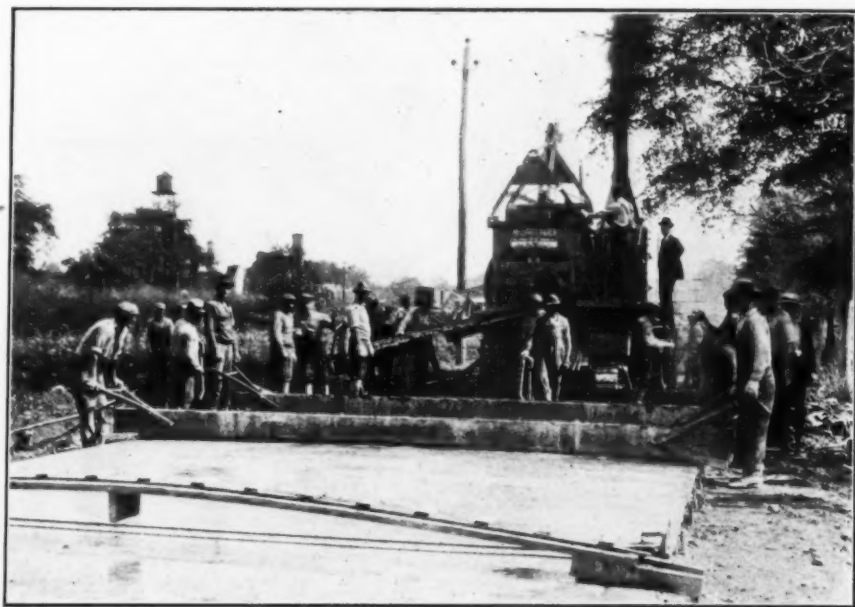
### A 22,000-GALLON HEATING AND STORAGE TANK FOR BITUMINOUS MATERIALS IN CHATTANOOGA, TENN.

This tank was furnished to the city by the Mills Contractors Equipment Company of Chattanooga



**BUILDING THE HARLEM CREEK SEWER, ST. LOUIS, MO.**

The Smith tilting mixer illustrated was sold to the Department of Streets and Sewers by the George F. Smith Company, of St. Louis



**THE CHESTER GENERAL CONTRACTING COMPANY, EAST LIVERPOOL, OHIO, BUILDING THE DARLINGTON - EAST PALESTINE ROAD, DARLINGTON COUNTY, PA.**

A Foote paver and 57,500 square yards of Truscon 56-pound wire reinforcing were used

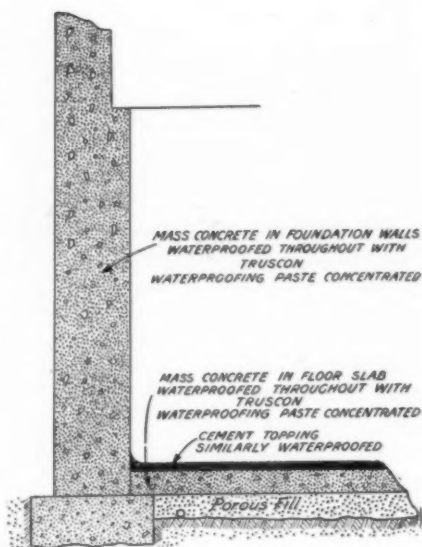


## Waterproofing Mass Concrete by the Integral Method

THE use of the integral method of waterproofing mass concrete is applicable to any new concrete operation, including concrete basements, concrete tanks, reservoirs, tubes, tunnels, and like structures. In using the concentrated waterproofing paste made by the Truscon Laboratories, Detroit, Mich., no change in the original concrete operation is required, except the introduction of the proper quantity of paste to the gaging water. There is no change in the proportions of sand, cement or stone, and no change in the mixing, pouring or placing, but the aggregate, instead of being tempered with clear water, is tempered with water into which a definite portion of Truscon concentrated waterproofing paste has been mixed. No precautions or methods, except those which are ordinarily employed in any simple concrete operation, are necessary.

### Method of Waterproofing

The concrete composing the main body of the structure should consist of one part cement to two parts of sand and four parts of stone. Any standard brand of cement passing all the requirements of the standard specification of the American Society for Testing Materials can be used. The sand should be of spherical grains of any hard rock practically free from clay, absolutely free from organic matter, and universally graded in size from coarse to fine. The stone should be screened from gravel, and 60 per cent of its bulk be uniformly graded between the diameters of 1 and  $1\frac{1}{2}$  inches, and 40 per cent of its bulk be uniformly graded between the diameters of  $\frac{3}{4}$ - and 1 inch. A hard crushed trap rock may be substituted, or gravel may be screened to meet the requirements indicated. The usual precautions in mixing should be taken. The mixing water



should consist of one part of waterproofing paste, concentrated, to every 36 parts of water.

The concrete should be placed in one continuous operation, each pouring being thoroughly spaded to insure uniform density. In cases where joints are absolutely unavoidable, very special care should be taken to clean and roughen the old surface and have it thoroughly wet and slush-coated immediately before placing additional concrete.

## New Hand Hoists for Motor Trucks

A NEW hand hoist for dumping motor trucks, of special interest to road contractors, has been placed on the market by the Heil Company, Milwaukee, Wis. The cross-head construction at the top permits the body to be placed next to the hoist, thus eliminating waste space except the eight inches required for the hoist itself. The body can be locked in any position, which makes it good for maintenance work where only a small part of the contents of the body is required to be dumped at any particular point. The body can be raised and the tail gate opened from the driver's seat.

This hand hoist is designed to lift loads up to five tons, and consequently is substantially

constructed throughout. All parts of the working mechanism that are under strain are steel castings, giving both strength and comparative lightness of weight. All working parts also are encased to keep out the dirt.

A cross-head is attached to the hoist frame. Cables, which are fastened to the drum, pass through sheaves in the cross-head and are attached to the body arms that are riveted to the body. This cross-head construction allows the body arm to be attached to the outside edges of the body, eliminating the troublesome problems of locating a space for them between the cross-members, brake rods, muffler, etc., of the chassis. The gear ratio is made low, so that comparatively little effort is required

## An All-Dunn Road



Conneaut—Ashtabula, Ohio, Section, Yellowstone Trail. Base course laid with Dunn Mile-A-Week Road Builder. Surface Wire-Cut Lug Brick.

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A steady growing number of our machines is every week adding substantially to the mileage of good roads that already stands to their credit.

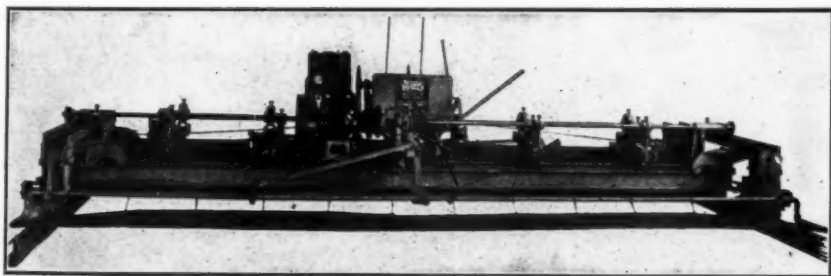
They are tamping and finishing according to specifications. They are leaving a surface that is free from voids and waves and that stands up under the terrific wear and tear of modern traffic conditions.

They are helping the contractor to a better profit in face of severe competitive conditions and to a high standing for the quality of his work.

Ask the contractors who are using Dunn Mile-A-Week Road Builders. Find out from them how well it will pay you to use one of our machines in your work.

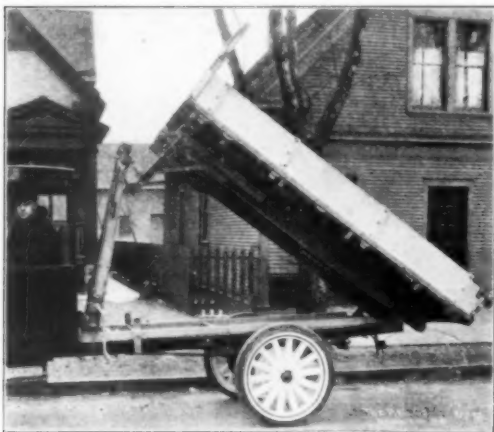
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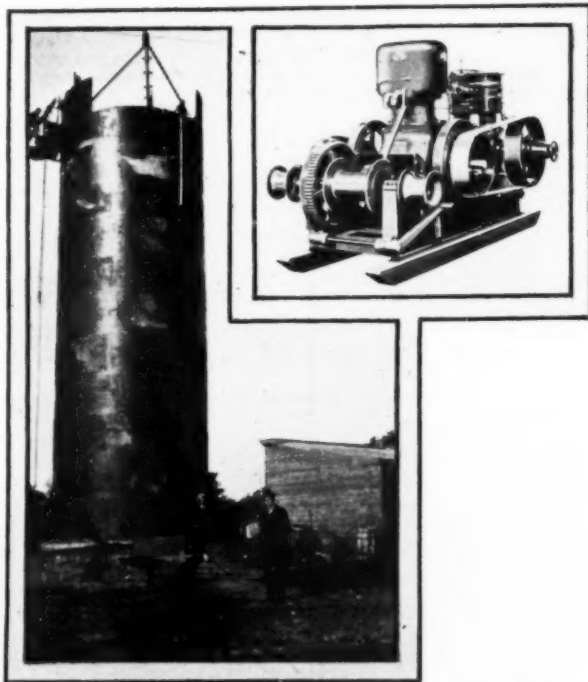
to raise a loaded body. It takes approximately one minute to a minute and a half to dump a load. The dumping angle varies from 35 to 40 degrees, depending on the length of the body. After the body has been raised and the load dumped, the body returns to the down position by its own weight. The brake for retarding the downward movement of the body is located next to the handle. The hoist can be mounted on any make of chassis, as the standards that attach to the truck are adjustable. It weighs 290 pounds and is furnished by the manufacturer ready for installing with U-bolts.



## Erecting a Steel Stand-Pipe

**I**N the latter part of 1921 the Pittsburgh-Des Moines Steel Company, Pittsburgh, Pa., erected a 176,000-gallon stand-pipe for the Tuberculosis Sanitarium at New Bedford, Mass. The stand-pipe is 30 feet in diameter and 75 feet high. It was built in accordance with specifications furnished by the city of New Bedford, which were unusual in that the tank was constructed completely of genuine wrought iron instead of the usual soft steel. This presented some difficulty in riveting, which was, however, overcome readily, and the tank was completed to the entire satisfaction of the city officials.

The tank is covered with a conical roof and is equipped with the usual fittings, such as ladders, man-holes, etc. In the construction a Novo combination hoist and compressor was used for hoisting the sections of the tank into place and for riveting them together. The combination outfit successfully speeded up construction.



**THE STAND-PIPE AND THE HOIST THAT DID THE WORK**



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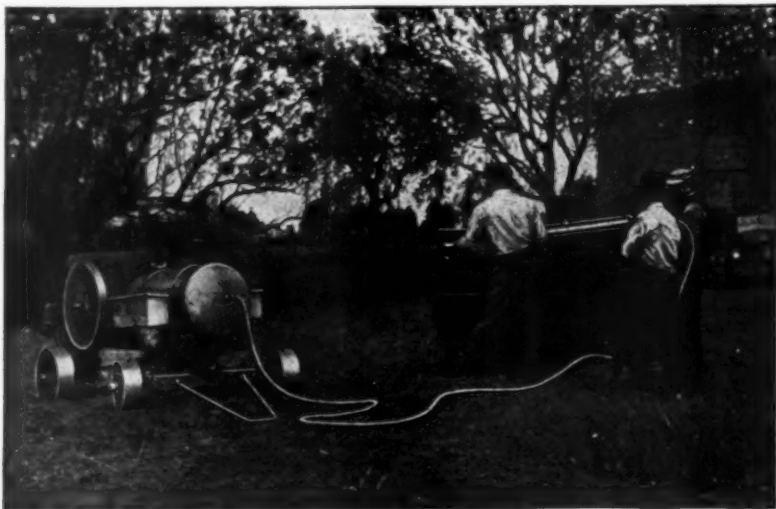
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## Pneumatic Rivet-Cutting Machines

Their Value and Economy in Dismantling Steel Structures

**D**ISMANTLING iron and steel structures has always been a difficult job, owing to the awkwardness of cutting the rivets. Most of the rivets are so located that it is difficult for one or more men to get a foothold and incidentally to deliver a blow hard enough to knock off the rivet head. Acetylene gas and electric cutting units have made it possible to rapidly dismantle structures, but when it is desired to salvage the greatest number of beams and plates, it is necessary, in most instances, to cut the rivet head.

One of these combinations can easily dismantle a good-sized steel structure in a day's time, and therefore the moving-about feature is a very important one. Ordinarily three men handle the tool, although two men can get along with it very satisfactorily. One of the men must guide the nose or bit, and another man must be at the handle and operate the valve. For every stroke of the piston, he must shove the valve open, and after just a little practice he becomes so adept at the operation of the valve that from two to four blows are



AIR COMPRESSOR AND RIVET-CUTTING GUN IN ACTION

One of the rivet-cutting guns shown in the accompanying picture will do the work of 20 men striking by hand. Such guns are admirable for use by wrecking companies, scrap yards or large steel-erecting companies, and can cut off five or six rivets per minute. For supplying the compressed air for such a machine a No. 30 Schramm portable compressor is suitable, as it furnishes enough air to take care of most jobs and weighs only 2,000 pounds. It can readily be moved about on the job.

all that is needed to remove the head of the rivet.

The same rivet-cutting gun is used for many other purposes. It has been found handy for cutting up concrete, tearing up flooring, and similar work where a hard blow is required. The only equipment necessary in addition to the compressor and rivet-cutting gun, is a 50-foot length of  $\frac{3}{4}$ -inch wire-wound air hose and leader hose with quick-acting couplings and valves.

Frederick W. Ballard, of F. W. Ballard & Company, Engineers, Bulkley Building, Cleveland, Ohio, has been appointed chief engineer of the American Super-Power Corporation. It was Mr. Ballard who advised the city of Buffalo to endorse the application of the Niagara Power and Development Company when that company appeared before the Federal Power Commission

in 1920. The American Super-Power Corporation has filed an application with the Federal Power Commission for the construction of a transmission line from Niagara Falls to Yonkers, N. Y., designed to supply light and power to New York City, as well as to other cities and communities in the south central and southeastern part of the state.





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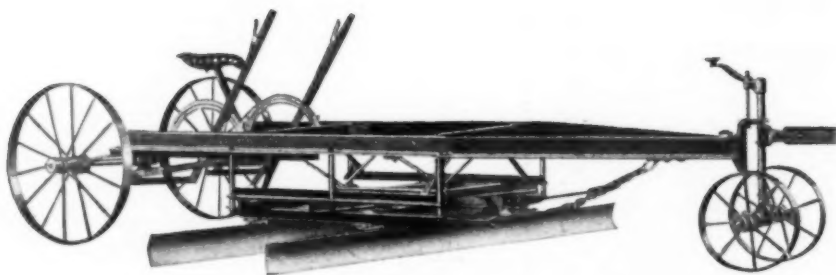
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## A General Utility Road Machine

A Machine Combining the Usefulness of the Road Drag and the Road Grader

**A** ONE-MAN machine, which combines the advantages of the road drag and the road grader, has just been placed on the market by the Glide Road Machine Company, Minneapolis, Minn., and is known as the Jarmin Road Fixer. It is believed that this machine will materially aid in reducing the cost of maintaining dirt- and gravel-surfaced roads. The machine dispenses with the road drag and does practically all of the work that a two-man grader will do in maintaining roads. One man or a boy with two or four horses or a tractor, depending upon the amount and condition of the material to be cut or moved, can handle the work readily. It has a long wheel-base and two cutting edges which travel forward on a level horizontal line. The high places are shaved off and the low places filled in. With this machine, ditches can be cleaned by moving the material toward the center of the road.

The angle of the blade of this machine can be set so that it can handle either surfacing or crowning. There is a simple positive adjustment within easy reach of the operator, permitting him to change the angle of the blades at will, as well as to regulate the pressure upon them. The subframe that carries the blades is so connected with the main frame as to allow no up-and-down blade movement. By this arrangement the blades are held down on the high places by the weight of the machine and are carried over the low places, depositing the material where it is needed. The wheel-base is 156 inches—a distinct advantage, as the two 8-foot blades are positively carried by the frame and prevent a choppy surface, which

occurs sometimes with a light grader when the blade jumps.

It is claimed that this machine cuts maintenance costs in halves, because one man with a team, a one-ton truck or a tractor can do more work than with any other type of maintenance equipment. When the Road Fixer is used with a light truck or tractor, the levers can be set on to the required angle and depth. Whenever the condition of the road is such as to require frequent changes in the set of the blades, an assistant can ride and operate the machine, but generally both truck and Road Fixer are operated by one man.

County engineers report that a number of advantages have been noted in the use of the Road Fixer on their roads. It has been found that the roads have a smoother surface all the time, and defects in the drainage are discovered and remedied. Less crown is required, making the roads more comfortable to drive on and safer when vehicles pass each other. A flatter road surface has a tendency to spread the traffic over a wider strip of the road, keeping it in better condition. Both counties and contractors in building roads find the machine very useful in preparing the subbase for the crushed rock or gravel, also in spreading the gravel after it is dumped on the road. One contractor stated that he had spread evenly 500 cubic yards of gravel in one day with one machine, doing the work much more satisfactorily than it could have been done by hand. The machine spreads the fine material with the coarse, and spreads it uniformly so that it will settle and wear evenly.

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Guesswork is a poor subgrade on which to build a contracting business, and the contractor who tries it soon loses his footing.

—Highway News Digest.



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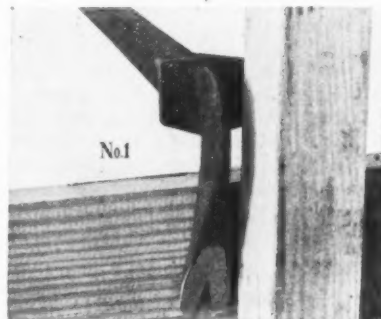
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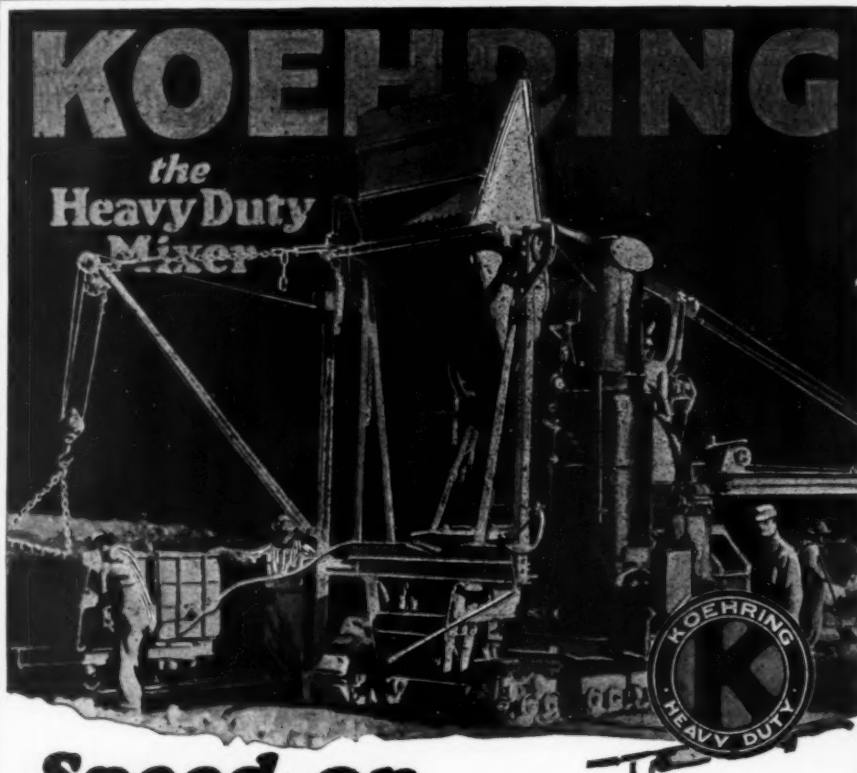
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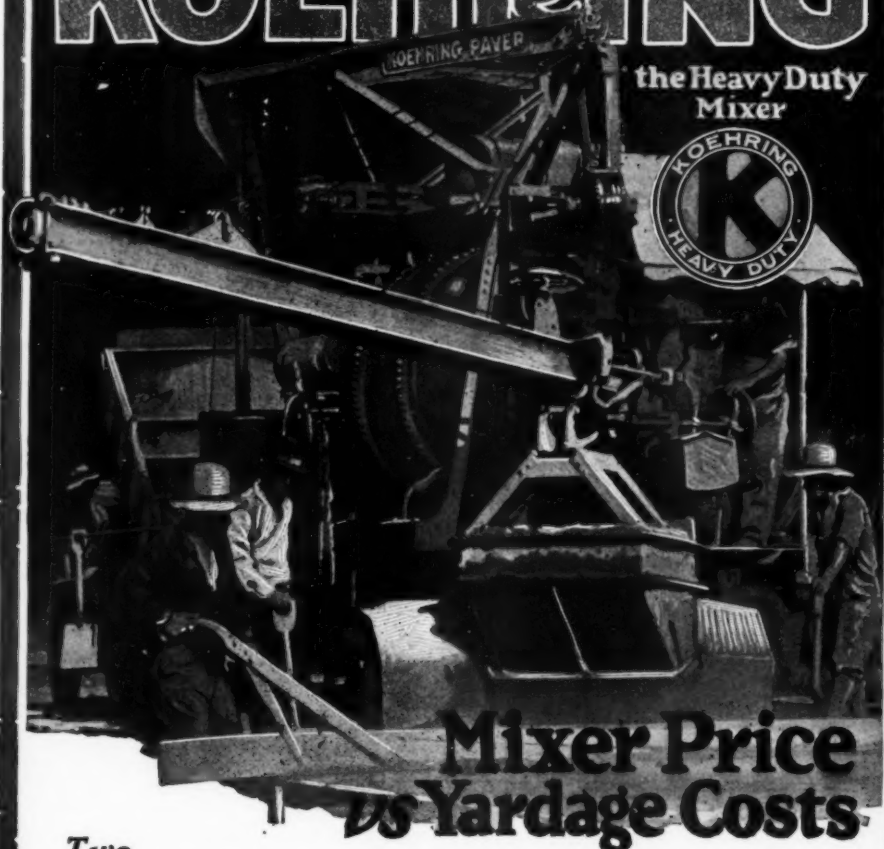
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# Distributors of Contractors' Equipment

THE following cards (arranged by states) show the names of dealers in contractors' equipment and supplies with a record of the various lines handled. Contractors will find this list a convenient means of getting in touch with dealers who make a point of giving satisfactory service and prompt shipments. This directory is constantly consulted by our subscribers and any suggestions regarding it will be welcomed.

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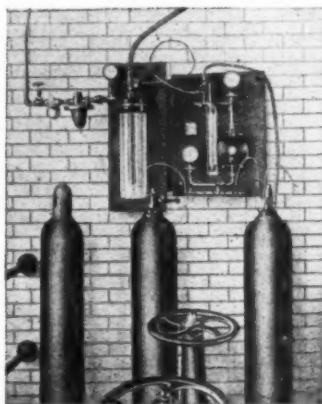
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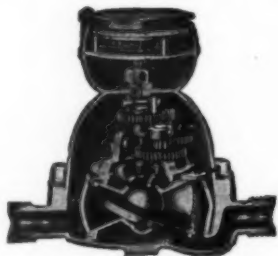
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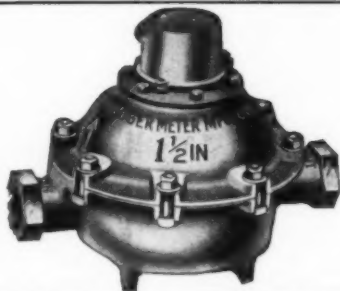
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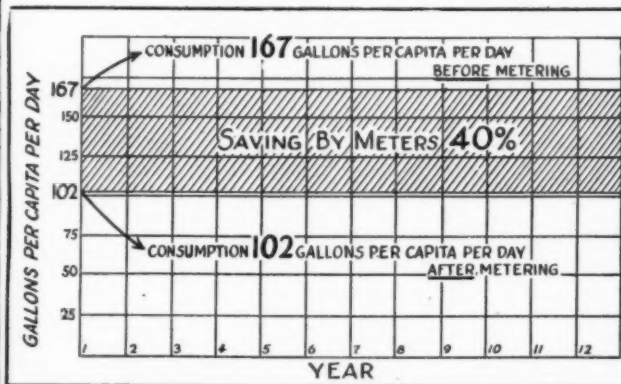
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Makers of the Trident Water Meter

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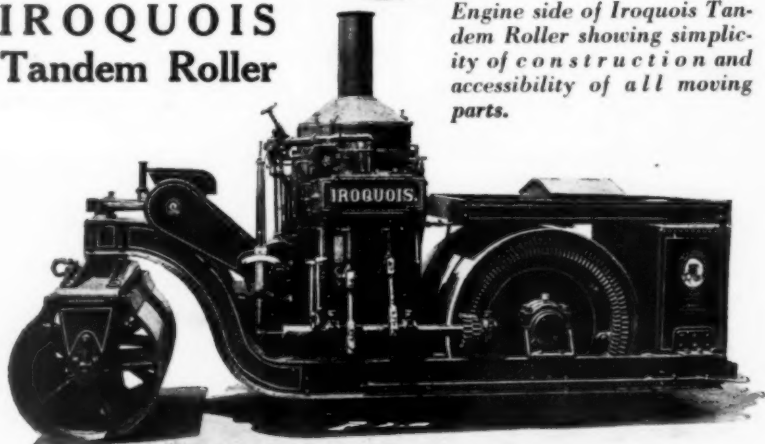
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